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The College of Agriculture, Forestry, and Home Economics

Announcement of Courses in Agriculture for the Year 1918-1919

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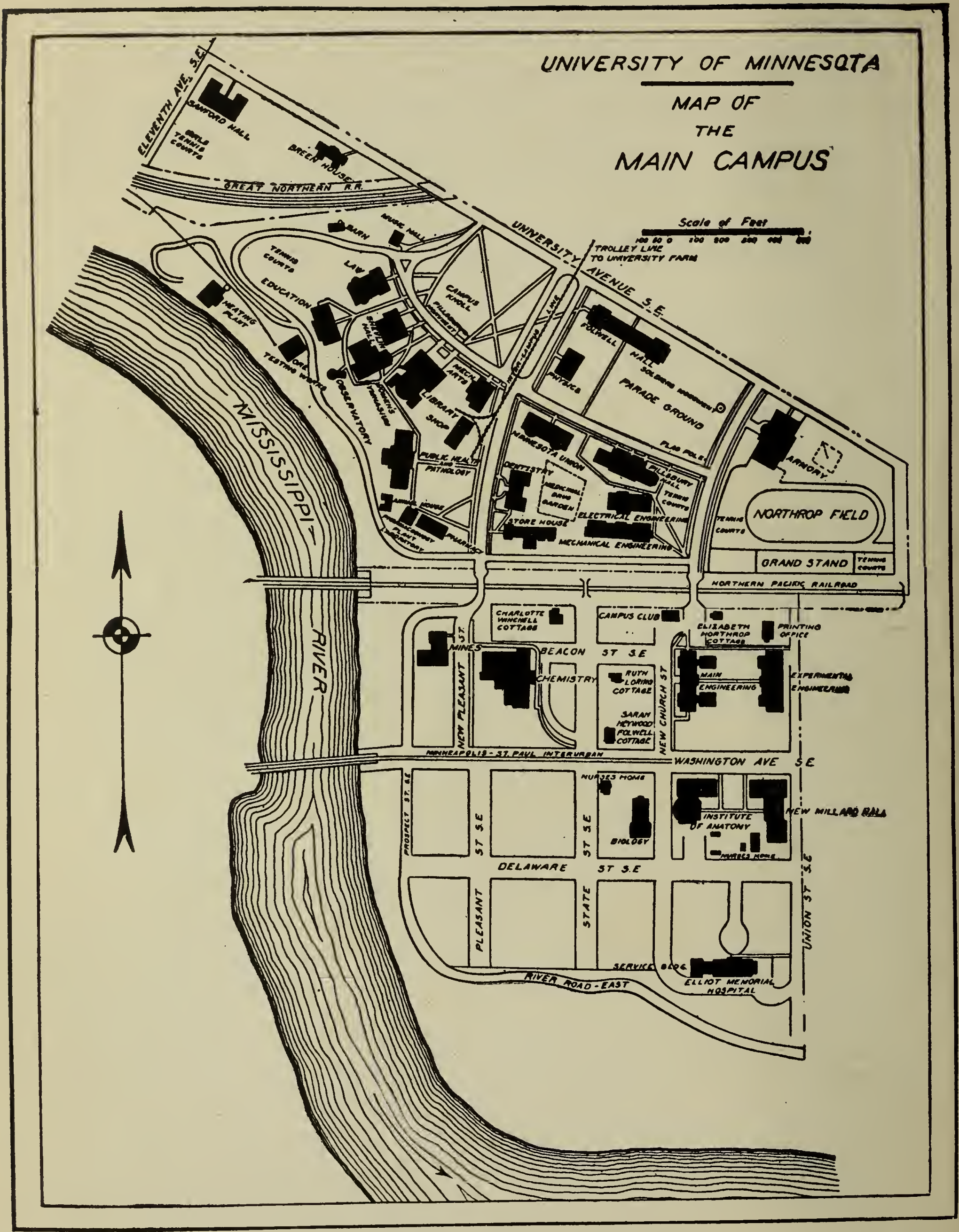
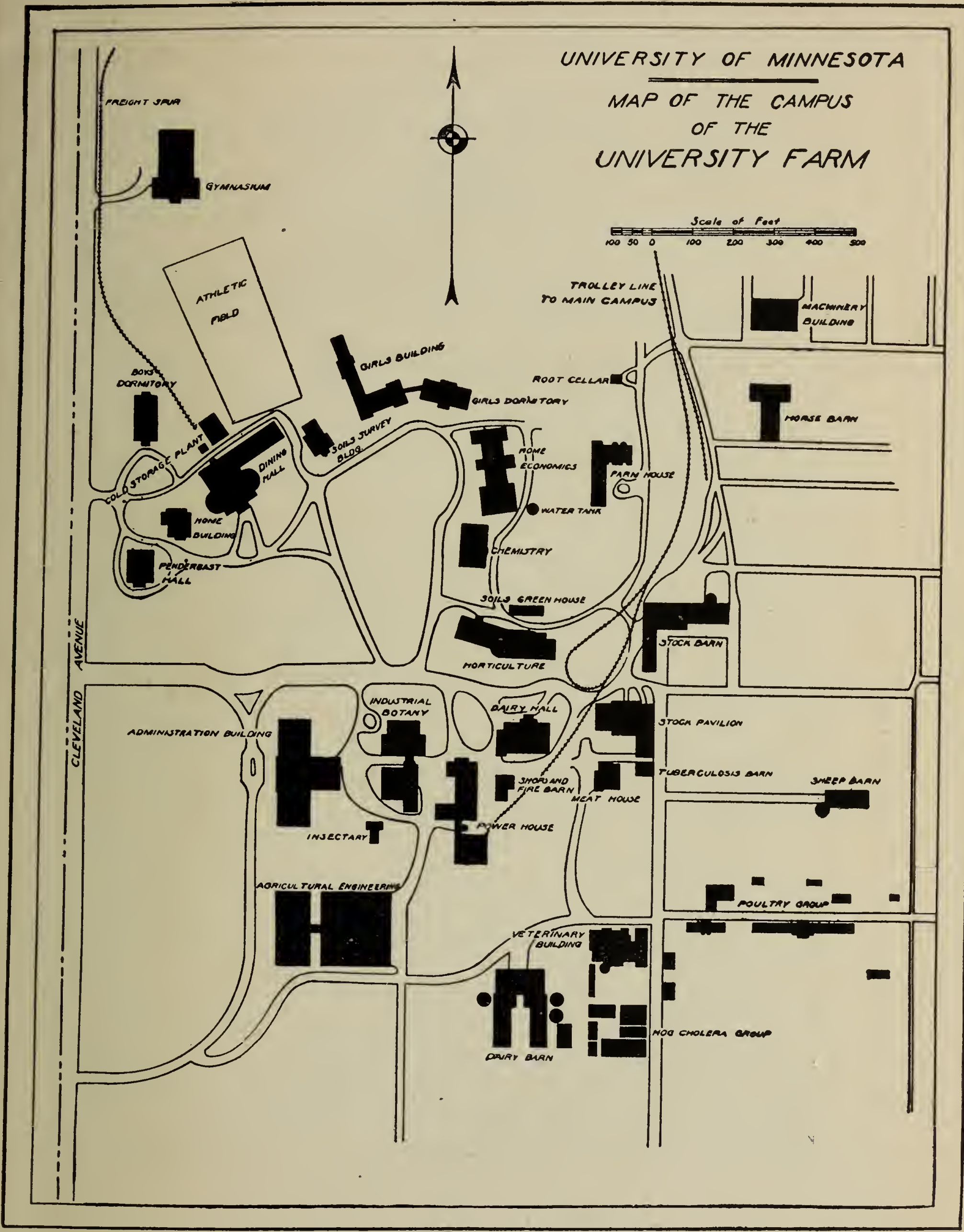


Area of Main Campus, 108.5 acres



Area of University Farm, 422.56 acres

1918

JULY

Su	Mo	Tu	W	Th	Fr	Sa
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AUGUST

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SEPTEMBER

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OCTOBER

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DECEMBER

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1919

JANUARY

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JULY

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AUGUST

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SEPTEMBER

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OCTOBER

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NOVEMBER

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CALENDAR

COLLEGE OF AGRICULTURE, FORESTRY, AND HOME ECONOMICS

1918-1919

1918			
September	11	Wednesday	Registration closes except for new students
September	17-24	Week	Entrance examinations, registration of new students, and payment of fees
September	25	Wednesday	First semester begins
September	30	Monday	Farm experience examinations
October	11	Friday	Half holiday. Annual freshman-sophomore contest
October	17	Thursday	Senate meeting, 4:00 p.m.
October	19	Saturday	Last day for removal of second semester incompletes
October	28	Monday	School of Agriculture, first term begins
November	5	Tuesday	General Election Day; a holiday
November	27	Wednesday	Thanksgiving recess begins 9:00 p.m.
December	2	Monday	Thanksgiving recess ends 8:00 a.m.
December	2-7	Week	Second semester condition examinations
December	3	Tuesday	Creamery Butter Makers' Short Course (10-days' session), and Cheese Makers' Short Course (three-weeks' session) begin
December	16-20	Week	Ice Cream Makers' Short Course
December	20	Friday	School of Agriculture, first term closes
December	21	Saturday	Christmas vacation begins 12 m.
1919			
December January	30 4	Week	Farmers' and Home-Makers' Week Short Course
January	2	Thursday	Christmas vacation ends 8:00 a.m. Senior field work in forestry begins
January	6	Monday	School of Agriculture, second term begins
January	6	Monday	Dairy Short Course begins
January	20	Monday	Second semester registration closes except for new students
January	27	Monday	Final examinations begin
January February	31 1		Registration of new students and payment of fees
February	3	Monday	Second semester begins. Senior field work in forestry closes
February	12	Wednesday	Lincoln's Birthday; a holiday
February	20	Thursday	Senate meeting, 4:00 p.m.

February	22	Saturday	Washington's Birthday; a holiday
February	29	Saturday	Last day for removal of first semester incompletes
March	26	Wednesday	School of Agriculture closes
March April	31 5	Week	Boys' and Girls' Week
April	17	Thursday	Easter recess begins 9:00 p.m.
April	22	Tuesday	Easter recess ends 8:00 a.m.
April	22-26	Week	First semester condition examinations
May	15	Thursday	Senate meeting, 4:00 p.m.
May	23	Friday	Final examinations begin 2:00 p.m.
May	30	Friday	Memorial Day; a holiday
May	31	Saturday	Second semester closes
June	1	Sunday	Baccalaureate service
June	2	Monday	Senior Class Day exercises
June	4	Wednesday	Alumni Day
June	5	Thursday	Forty-seventh Annual Commencement
June	6	Friday	Summer vacation begins
June	11	Wednesday	Freshman work in forestry at Itasca Park begins
June	16	Monday	Summer Session and Teachers' Training School begin
August	16	Saturday	Freshman forestry work at Itasca Park closes

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FACULTY COMMITTEES

1918-1919

Executive.—Executive Committee of the Department of Agriculture.

Enrollment.—West, Biester, Dutcher, Mowry, Pierce, Wentling.

Curriculum and Catalog

Agricultural Courses.—Boss, Brierley, Gay, Hayes, Storm, West.

Forestry Courses.—Cheyney, Allison, Kenety, Wentling.

Home Economics Courses.—Berry, H. Goldstein, Vermilye, Weigley, Weller.

Students' Work.—Freeman, Beggs, Berry, Cheyney, Nicholson, West.

Student Organizations.—Lansing, Fitch, Freeman, Weigley, Weller.

Faculty Business.—Gortner, Ruggles, Stakman, Vermilye.

Appointment.—Storm, Arny, Berry, Weigley.

Farm Experience.—Boss, Brierley, Kildee, Paterson.

GENERAL INFORMATION

ADMISSION

New students are admitted at the opening of the first semester in September and the second semester in February.

All students entering for the first time must submit their credentials to the Enrollment Committee.

Admission is either by certificate or by examination. Candidates must have completed the equivalent of a four-year high school course and must present:

1. Four units of English; or three units of English and four units of a foreign language; or three units of English and two units in each of two foreign languages.
2. One unit of algebra and one unit of plane geometry.
3. Enough additional work to make in all fifteen units, of which not more than four may be in subjects not listed in the admission groups.

Graduates of the School of Agriculture of the University of Minnesota who have completed the two summers of supervised work offered in the School course, one additional School year, and one additional summer's work, or the equivalent thereof, will be admitted to the College of Agriculture, Forestry, and Home Economics.

For details of admission requirements and definition of "unit," see the Bulletin of General Information.

Every prospective student is urged to obtain before entering college at least six months' practical experience on a farm. Entering students whose farm experience credentials are not satisfactory will be examined as to their familiarity with farm practices, and farm experience will be required during the college course in accordance with the results of these examinations. For students specializing in Dairy Husbandry at least three of the six months of approved farm experience must be on an accredited dairy farm.

Applicants for admission are urged to present Physics (1 unit), Chemistry (1 unit), and Higher Algebra (½ unit), for entrance credits. If these subjects are not completed in the high school, they will have to be taken in the University, thus postponing some of the vocational courses.

FEES

Incidental semester fee	
Residents of Minnesota	$20.00
Non-residents	40.00
Deposit (first semester only)	5.00
Health fee (per semester)	3.00
Military Deposit (freshmen or sophomores, first semester in residence only) Subject to change to meet contract price of uniform	23.65
Gymnasium suit deposit	4.51
Minnesota Union (per semester)	1.00

Special fees

Examination for removal of conditions	1.00
Examinations for credit (after the first semester in residence)	5.00
Special examinations	5.00
Change of registration	2.50

Late registration.—Old students must indicate their registration not later than two weeks before the day set for classes to begin. All students must complete their registration (including payment of fees) before the day set for classes to begin. Penalty for delay in either indicating or completing registration, one dollar. An additional twenty-five cents is charged for each day of delay after the last day set for the completion of registration and a similar charge for each day of delay after the last day set for payment of fees.

Important.—The regulations require that no student be allowed to register after the semester opens except by special committee action.

FACULTY REGULATIONS

Students are held responsible for compliance with all faculty regulations. These regulations are published in a booklet issued to students at the time of registration.

REQUIREMENTS FOR GRADUATION AND DEGREES

After the completion of the prescribed course of study, including all of the required work and the requisite amount of elective work equivalent to a total of 144 credit hours, candidates will be recommended for graduation with the degree of Bachelor of Science.

PROFESSIONAL CERTIFICATE

The University State Teachers' Certificate in Agricultural Education will be granted in 1918-19 to graduates of the College of Agriculture, Forestry, and Home Economics, who have completed fifteen hours in approved professional courses, and to graduates of the College of Education who have carried the prescribed course leading to such a certificate.

The Industrial Certificate which all Minnesota teachers of agriculture are required to have, will be granted in 1918-19 by the State Department of Education to graduates of the College of Agriculture, Forestry, and Home Economics, who are recommended by the College and who have the professional training required by the regulations of the State Department of Education for special teachers of agriculture, and to graduates of the College of Education who have completed the course leading to such a certificate.

Students desiring this industrial certificate should consult with the Chief of the division of Agricultural Education before registering for the work in the junior year.

COURSE OF STUDY

The work of the freshman year and a majority of that of the sophomore year is the same for all students. The work of the junior and senior years is arranged to permit specialization.

The College recognizes four principal groups of students:

1. Those who are preparing for general agricultural pursuits, such as county agent work, dairying, stock raising, vegetable and fruit farming, grain farming, and the management of general and specialized types of farms.

2. Those who are preparing to become specialists in any of the above lines for the practice of professional agriculture in college or experiment station. For these students graduate work after the completion of the prescribed course is advised.

3. Those who are preparing to become teachers of agriculture and manual training in secondary schools.

4. Those who expect to become specialists in some one of the special agricultural sciences such as Agricultural Biochemistry, Agricultural Economics, Entomology, Plant Breeding, Plant Pathology, Soils, etc. For thoro preparation in any of the lines listed in this group, graduate work, after the completion of the four-year course, is essential.

Groups of courses, supplementary to those required of all students, are outlined on pages 23 to 25. Some one of these should be chosen not later than the close of the freshman year.

Students who have in mind some definite field of work not covered by these suggested lines of specialization should consult the Dean of the College for advice in the modification of his course of study or for the arrangement of a curriculum particularly suited to the vocation for which he desires to prepare himself.

After selecting or arranging such a course of study, each student should consult frequently with the head of the division, or divisions, giving the major work in his curriculum, advising particularly with reference to electives and practical vacation work which may be of value in his chosen line of specialization.

EXPLANATION OF COURSE NUMBERS

Odd numbers indicate first-semester courses; even numbers, second-semester courses. A combination of the two (e.g., 5-6) indicates courses continuing through the year. In the case of courses repeated the second semester, the suffix *a* indicates first semester, the suffix *b*, second semester.

All undergraduate courses are numbered from 1 to 100. All courses open to undergraduates and graduates are numbered from 101 to 200.

Numbers following the descriptive name of a course indicate the number of credit hours.

Course numbers in parentheses, following the number of credit hours indicate prerequisite courses.

One credit hour is equivalent to (1) one lecture or recitation period requiring two hours of preparation, (2) two periods of laboratory work requiring one hour of preparation, or (3) three periods of laboratory work with no preparation, each week for one semester.

GROUP I. GENERAL REQUIREMENTS FOR ALL STUDENTS IN AGRICULTURE

FRESHMAN YEAR

All of the following work is required of every student except for the exemptions indicated. For some students this represents more than the regular amount of work of 18 credit hours per semester. In such cases those subjects listed below which can not be taken in the freshman year must take precedence the following year.

1. *Non-credit courses* required for graduation in addition to the 144 credit hours.

Agron. 7, Farm Practices. Those entering with sufficient knowledge of general farm practices, as shown by certificate or examination, are exempt.

Freshman Lectures. A course of nine lectures intended primarily to familiarize the new student with the College, college customs, and methods of procedure.

Military Drill. One afternoon per week both semesters. Students found to be physically unfit may be required to substitute special corrective exercises in gymnasium.

Phys. Educ. 1, Personal Hygiene. Two lectures per week, first six weeks of the first semester.

Phys. Educ. 3a,b, Gymnasium. Two hours per week, last twelve weeks of the first semester or the first twelve weeks of the second semester.

2. *General courses.*—All of the following, except An. Biol. 3-4, Chem. 33, and Rhet. 3, may be registered for either semester except that the proper sequence of continuation courses and the prerequisites must be observed. Ordinarily, if Botany is registered for in the freshman year, registration for Zoology should be postponed until the sophomore year, and vice versa.

Agron. 1a,b, Farm Crops, 3

An. Biol. 3-4, General Zoology, 6. Should be postponed until the sophomore year by those who take Bot. 1-2.

An. Husb. 1a,b, Types and Breeds of Livestock, 3.

Bot. 1a,b,–2a,b, General Botany, 6. Students presenting a unit of high-school botany for admission may omit the first semester and substitute three credits elective later in their course of study. This course should be postponed until the sophomore year by those who take An. Biol. 3-4.

Chem. 3a,b, Advanced General Chemistry and Qualitative Analysis, 3. Those required to take Chem. 33 are exempt.

Chem. 33, General Chemistry and Qualitative Analysis, 5. Students presenting one unit of high-school chemistry may omit this course and register for Course 3. Those required to take this course because of inability to successfully carry Course 3 will be allowed not more than three credits.

Chem. 4a,b, General Chemistry and Qualitative Analysis, 3. (Chem. 3 or 33)

Dy. Husb. 7a,b, Elements of Dairy Husbandry, 3.

Econ. 2a,b, Industries and Commerce of the United States, 3.

Farm Eng. 11a,b, Applied Mathematics, 3. Students presenting a half unit of higher algebra for admission may omit this and substitute three credits elective later in their course of study.

Farm. Eng. 13a,b, Farm Motors, 3

Hort. 90a,b, General Horticulture, 3. This course should be omitted by those intending to specialize in any horticultural line of work or in Agricultural Education and three credits elective substituted later in the course of study.

Rhet. 1a,b,–2a,b, Rhetoric, 6

Rhet. 3, Elementary Rhetoric, 3. Required only of those who are found to be unable to carry Course 1.

SOPHOMORE YEAR

1. *Non-credit courses* required for graduation in addition to the 144 credit hours.

Military Drill. One afternoon per week both semesters. Students found to be physically unfit may be required to substitute special corrective exercises in gymnasium.

2. *Freshman courses* which were not completed during the freshman year.

3. *General courses.*—With the exception of Farm Eng. 21-22, these courses may be registered for either semester except that the proper sequence of continuation courses and prerequisites must be observed.

Agr. Biochem. 7-8, General Agricultural Biochemistry, 6. (Chem. 6 cred.). Not required of those who are specializing in a course of study requiring Chem. 35-36.

Econ. 3a,b, Principles of Economics, 3

Farm Eng. 3a,b, Mechanical Drawing 3. Those presenting a unit of high-school mechanical drawing may omit this and substitute three credit hours elective later in their course of study.

Farm. Eng. 21-22, Agricultural Physics, 6. Those presenting a unit of high-school physics and those selecting a line of specialization which requires Physics 1-2, may omit this and substitute six credit hours elective later in their course of study.

Path. 6a,b, Elementary Bacteriology, 3

Pol. Sci., 1a,b, American Government, 3

Rhet. 11a,b, Argumentation, 3 (Rhet. 2)

Rhet. 22a,b, Public Speaking, 3 (Rhet. 2)

4. *Special courses* as prescribed by the curriculum of the line of specialization selected. Enough of these courses should be selected to make up, together with those listed in 2 and 3 above, eighteen credit hours each semester. See special requirements on pages 23 to 25.

JUNIOR YEAR

1. *General courses.*—Soils, 2, Soils, 4. (Chem. 6 cred.)
2. *Special courses* as prescribed by the curriculum of the line of specialization. See special requirements on pages 23 to 25.
3. *Electives.*—Enough elective credits should be registered for to make up with 1 and 2, above, 18 credit hours each semester.

SENIOR YEAR

1. *Special courses* as prescribed by the curriculum of the line of specialization selected. See special requirements on pages 23 to 25.
2. *Electives.*—Enough elective credits should be registered for to make up, with the special courses, 18 credit hours each semester.

GROUP II. SPECIAL REQUIREMENTS IN THE DIFFERENT LINES OF SPECIALIZATION (SUPPLEMENTARY TO GROUP I)

Course descriptions will be found under corresponding course numbers of divisions indicated. These are arranged in alphabetical order on pages 27 to 73. In planning registration please note particularly (a) prerequisites for prescribed courses; (b) classes of students to which courses are offered; (c) number of credits; (d) semester or semesters offered (indicated by course numbers, see page 20), and be sure that provision is made in registration for the proper sequence of continuation and full year courses. In arranging a program, required courses which are not repeated each semester should be given precedence.

AGRICULTURAL BIOCHEMISTRY

General statement.—Students specializing in Agricultural Biochemistry are expected to include among their electives the following courses or their equivalent: Ger. 1, French 1, Bot. 9-10 or Physiol. 103-104, and as much Mathematics as practicable. The following sequence of Mathematics courses is suggested as desirable: Math. 1, 2, 9, and 11 (see bulletin of College of Science, Literature, and the Arts).

Sophomore year, 8 credits: Chem. 35-36

Junior year, 21 credits: Agr. Biochem. 9-10; Physics 1-2, 3-4; Pl. Path. 11

Senior year, 16 credits: Agr. Biochem. 111, 113; Chem. 121-122, 123-124; Soils 104a.

AGRICULTURAL ECONOMICS

Sophomore year, 3 credits: Econ. 18

Junior year, 28 credits: Agron. 101b, 107; An. Husb. 13; Econ. 19, Econ. Elect. (6 cred.); Ent. 3; Farm Eng. 10; Pl. Path. 1.

Senior year, 24 credits: Agron. 102, Agron. Elect. (3 cred.), F. Mgt. Elect. (3 cred.); Econ. 101, 107, 108, 119, 120.

AGRICULTURAL EDUCATION

General statement.—Students desiring to procure a State Professional Certificate should consult the Chief of the Division of Agricultural Education before registering for the work of the sophomore year.

Sophomore year, 6 credits: Agr. Educ. 11, 21 or Educ. 5

Junior year, 33 credits: Agr. Educ. 68, Agron. 3b, 107, 110; An. Husb. 3, 4, 5, 13; Dy. Husb. 4; Ent. 3; Pl. Path. 1; Vet. Med. 8

Senior year, 24 credits: Agr. Educ. 41, 131, 151; Agron. 102; Farm Eng. 7; Pl. Path. 6, 9; Poult. Husb. 1

AGRICULTURAL EDUCATION—MANUAL TRAINING

General statement.—Students desiring to procure a state professional certificate should consult the Chief of the Agricultural Education Division before registering for the work of the sophomore year.

In order to be certified for the Industrial certificate in Manual Training and Agriculture, the following courses must be completed in addition to the required work outlined below: An. Husb. 5, 13 (junior year), and Poult. Husb. 1, Ent. 16 (senior year).

Sophomore year, 6 credits: Agr. Educ. 11, 21 or Educ. 5

Junior year, 27 credits: Agr. Educ. 68; Agron. 3b, 107, 110; An. Husb. 3, 4; Dy. Husb. 4; Ent. 3; Pl. Path. 1; Vet. Med. 8

Senior year, 27 credits: Agr. Educ. 41, 131, 133, 151; Agron. 102; Farm Eng. 4 or 16, 5, 7, Adv. Draw. or Adv. Woodwork

AGRONOMY

Sophomore year, 6 credits: Bot. Elect. (6 cred.)

Junior year, 18 credits: Agron. 107; An. Nutr. 1; Dy. Husb. 2; Ent. 3; Pl. Path. 1; Vet. Med. 8

Senior year, 25 credits: Agron. 102, 103, 106, 110; Agron. Elect. (3 cred.); An. Husb. 7; Farm. Eng. 7; Pl. Path. 9

ANIMAL HUSBANDRY

General statement.—Students specializing in Animal Husbandry are advised to select at least a portion of their electives from the following: Agron. 103; Dy. Husb. 2; Econ. 18; Ent. 9; Rur. and Agr. Journ. 11-12

Sophomore year, 4½ credits: Dy. Husb. 4; Vet. Med. 2

Junior year, 19½ credits: An. Husb. 3, 4; An. Nutr. 1; Dy. Husb. 12; Vet. Med. 3-4, 6, 12

Senior year, 30 credits: Agron. 102, Agron. Elect. (3 cred.); An. Husb. 5, 7, 9, 101, and one of the following: 104, 106, 108, or 110; An. Husb. Elect. (4 cred.); Farm. Eng. 7; Poult. Husb. 1

DAIRY HUSBANDRY—PRODUCTION

General statement.—Students specializing in Dairy Husbandry are required to obtain at least three of the six months of approved farm experience required for graduation on an accredited dairy farm.

The following electives are recommended: Agron. 103; Econ. 18; Ent. 9; Poult. Husb. 1; Rur. and Agr. Journ. 11-12

Sophomore year, 7½ credits: Dy. Husb. 4, 11; Vet. Med. 2

Junior year, 24½ credits: Agron. Elect. (3 cred.); An. Husb. 3, 4; An. Nutr. 1; Dy. Husb. 2, 102; Vet. Med. 3-4, 6

Senior year, 22 credits: Agr. Biochem. 12; Agron. 102; An. Husb. 5, 7; Dy. Husb. 101; Farm. Eng. 7; Vet. Med. 12

DAIRY HUSBANDRY—MANUFACTURE

General statement.—Students specializing in Dairy Husbandry are required to obtain at least three of the six months of approved farm experience required for graduation on an accredited dairy farm.

The following electives are recommended: Agron. 5, 103; Econ. 18; Ent. 9; Poult. Husb. 1; Rur. and Agr. Journ. 11-12

Sophomore year, 7½ credits: Dy. Husb. 4, 11; Vet. Med. 2

Junior year, 24½ credits: An. Husb. 3, 4; An. Nutr. 1; Dy. Husb. 2, 9, 10; Vet. Med. 3-4, 6

Senior year, 22 credits: Agr. Biochem. 12; Agron. 102; An. Husb. 5, 7; Dy. Husb. 101; Farm. Eng. 7; Vet. Med. 12

ENTOMOLOGY AND ECONOMIC ZOOLOGY

General statement.—Students planning to specialize in Entomology and Economic Zoology are advised to register for An. Biol. 3-4 during their freshman year.

A reading knowledge of French and German is desirable and is essential to graduate work.

Sophomore year, 6 credits: Ent. 1-2

Junior year, 18 credits: Agron. Elect. (3 cred.); Ent. 101-102, Ent. or Hort. Elect. (3 cred.); Hort. Elect. (3 cred.); Pl. Path. 1

Senior year, 12 credits: Ent. 107-108, Pl. Path, 14, 107

FARM MANAGEMENT

Sophomore year, 3 credits: Econ. 18

Junior year, 21 credits: Agron. 101b, 107; An. Nutr. 1; Dy. Husb. 2; Ent. 3; Pl. Path. 1; Vet. Med. 8

Senior year, 25 credits: Agron. 102, 108, 110; An. Husb. 7; Econ. Elect. (3 cred.); Farm. Eng. 7; F. Mgt. Elect. (3 cred.); Pl. Path. 9

HORTICULTURE

General statement.—Electives should include work in Botany, Economics, Entomology, and Plant Pathology

Sophomore year, 6 credits: For. 21; Hort. 32

Junior year, 24 credits: Bot. Elect. (6 cred.); Ent. 1-2; Hort. 6; Hort. Elect. (3 cred.); Pl. Path. 1, 14

Senior year, 21 credits: Agron. 102; Hort. 105, 107 or 131, 109, 110; Hort. Elect. (6 cred.)

PLANT PATHOLOGY

General statement.—Students specializing in Plant Pathology should consult the Chief of the Division, with reference to requirements in mathematics, before registering for the work of the sophomore year.

Sophomore year, 6 credits: Bot. Elect. (6 cred.)

Junior year, 26 credits: Bot. Elect. (6 cred.); Ent. 3, 18; Physics 1-2, 3-4; Pl. Path. 1, 14

Senior year, 21 credits: Agr. Biochem. 111; Agron. 103; Bot. or Ent. Elect. (6 cred.); Hort. Elect. (3 cred.); Plant Path. 104, 107

SOILS

General statement.—Students specializing in Soils should consult the Chief of the Division, with reference to requirements in mathematics, before registering for the work of the sophomore year.

Sophomore year, 11 credits: Chem. 11-12; Geol. 1

Junior year, 27 credits: Chem. 35-36; Farm Eng. 10; Physics 1-2, 3-4; Pl. Path. 1; Soils 104a

Senior year, 19 credits: Agr. Biochem. 111; Agron. 102; Ent. 3; Geol. 21; Soils 106, 107, 110

ELECTIVES

Students should consult with the division in which they are specializing with reference to the elective courses which must be chosen to make up the 144 credit hours required for graduation.

Only a limited number of elective courses are open to freshmen. First year students, who for any reason are unable to follow the regular curriculum, are advised to fill their program with a required course from the sophomore schedule, if possible, and postpone the choice of electives until the sophomore year. This plan will enable the student to obtain a better view-point from which to select his electives and allow a wider range of subjects from which to choose.

FRESHMAN ELECTIVES

The following divisions and departments offer elective work to freshmen. For the descriptions of available courses see pages 27 to 73, and for departments marked S., L., and A., see bulletin of the College of Science, Literature, and the Arts.

Agricultural Education
Farm Engineering
Forestry
German
History (S., L., and A.)
Home Economics
Mathematics (S., L., and A.)
Poultry Husbandry
Romance Languages

SOPHOMORE, JUNIOR, AND SENIOR ELECTIVES

Nearly all of the divisions offer elective work to sophomores, juniors, and seniors. In selecting courses special attention should be paid to prerequisites, the classes to which the courses are offered, and, in the case of courses offered by departments of other schools and colleges of the University, to the regulations of the school or college concerned.

Elective courses in the college of Science, Literature, and the Arts, are separated into Junior College courses, open to freshmen and sophomores, and Senior College courses, open to juniors and seniors. In addition to satisfying other prerequisites an average grade of C (81-87) must be maintained for the first two years in order to register for a Senior College elective.

DESCRIPTION OF COURSES

For explanation of course numbers and credits see page 20.

AGRICULTURAL BIOCHEMISTRY

Professor Ross Aiken Gortner; Associate Professor Clyde H. Bailey; Assistant Professors R. Adams Dutcher, Clarence A. Morrow, John J. Willaman.

General statement.—This Division offers two types of work, namely, courses in those phases of chemistry which have special application in agriculture or home economics for students whose major work is in other divisions; and courses designed to train chemists for research or instruction in the special field of Agricultural Biochemistry. For specialization in this Division, see special requirements in Course of Study.

COURSES

No.	Title	Credits	Offered to	Prereq. courses
	Introductory Courses			
7-8.	General Agricultural Biochemistry...	6	Soph., jr., sr.	Chem. 1 yr.
9.	Quantitative Analysis...............	5	Jr., sr.	Chem. 2 yrs.
10.	Agr. Quant. Analysis..............	5	Jr., sr.	9
12.	Dairy Chemistry....................	5	Jr.. sr.	7-8
14.	Grain Grading......................	2	Jr., sr.	7-8, Agron. 110
	Advanced Courses			
105.	Detection of Adulteration..........	5	Sr.	10
106.	Agr. Products and By-Products.....	3	Sr.	10
108.	Chem. of Wheat and Its Products...	2	Sr.	3 or 7-8
110.	Flour Laboratory Methods.........	3	Sr.	10; parallel 108
111.	Phytochemistry	3	Sr.	Biol. 2 yrs., Org. Chem.
113.	Biochemical Lab. Methods..........	2	Sr.	Biol. 2 yrs., Org. Chem.
114.	Laboratory Problems................	3 or 5	Sr.	111, 113
115.	Chemistry of Animal Nutrition......	3	Jr., sr.	7-8

INTRODUCTORY COURSES

7-8. General Agricultural Biochemistry. A qualitative and quantitative study of the types of organic compounds found in plants and animals, and of the chemical changes which occur during the growth and utilization of plant and animal products. Dutcher.

9. Quantitative Analysis. The principles involved in gravimetric and volumetric analyses. The course includes the gravimetric determination of iron, sulphur, phosphorus, magnesium, and chlorine; acidimetry, alkalimetry; the volumetric determination of iron and calcium; and iodimetry. Morrow.

10. Agricultural Quantitative Analysis. Methods of proximate analysis of agricultural products, including the determination of moisture, ash, fats, starch, sugars, fiber, proteins, and the different nitrogenous constituents of foods and feeding stuffs. Morrow.

12. DAIRY CHEMISTRY. The chemistry of milk and its products. Preliminary practice in quantitative methods followed by laboratory work in the analysis of milk, butter, and cheese, and the detection of adulterants in them. DUTCHER.

14. GRAIN GRADING. A lecture and laboratory course in grain grading rules, regulations, and standards, and their application in grain grading practices. BAILEY.

ADVANCED COURSES

105. DETECTION OF ADULTERANTS OF FOODS AND FEEDING STUFFS. The use of proximate analyses and special tests for the determination of quality and the detection of adulteration of foods and feeds. Includes chemical and microscopical examinations. WILLAMAN.

106. AGRICULTURAL PRODUCTS AND BY-PRODUCTS. The composition of the principal products and by-products of agriculture and their utilization as raw material in various industries, and the methods of chemical control work in these industries. BAILEY.

108. CHEMISTRY OF WHEAT AND WHEAT PRODUCTS. A lecture course, with collateral library reference work, on the chemical technology of the production and milling of wheat and the conversion of its products into human food. BAILEY.

110. FLOUR LABORATORY METHODS. A laboratory course in the methods of analyses of wheat and its products; milling tests of wheat; and baking and special tests of flour. BAILEY.

111. PHYTOCHEMISTRY. An advanced course in the chemistry of fats, carbohydrates, tannins, proteins, enzymes, and colloids and their relation to the vital processes involved in plant and animal growth and nutrition. MORROW.

113. BIOCHEMICAL LABORATORY METHODS. Special methods of examination of plant and animal tissues for particular fats, carbohydrates, proteins, and enzymes. MORROW.

114. LABORATORY PROBLEMS IN BIOCHEMISTRY. Special laboratory work in the preparation and isolation of pure compounds which occur in living cells, in the study of biochemical reactions, and in special methods of identification or determination of biochemical products. GORTNER, BAILEY, DUTCHER, MORROW, WILLAMAN.

115. CHEMISTRY OF ANIMAL NUTRITION. A lecture and laboratory course emphasizing the chemical composition of feeding materials, animal tissues, animal by-products, and chemical processes involved in digestion and metabolism. Special attention will be paid to recent methods of nutritional investigation. DUTCHER.

AGRICULTURAL ECONOMICS

See Economics (page 43).

AGRICULTURAL EDUCATION

Professors Ashley V. Storm, Dexter D. Mayne, ...; Assistant Professors Albert M. Field, Bueford M. Gile; Instructors John V. Ankeny, Percy B. Barker, William P. Dyer; Extension Specialists Theodore A. Erickson, George F. Howard.

General statement.—For specialization in this department, see special requirements in Course of Study.

COURSES

No.	Title	Credits	Offered to	Prereq. courses
	Introductory Courses			
11a,b.	Principles of Vocational Education	3	†Soph., jr., sr.	None
21.	Vocational Education............	3	†Soph., jr., sr.	None
41a,b.	Teaching	3	†Sr.	131, Agron. 107, 110, see course description
63.	General Agriculture.............	3	All	None
64.	General Agriculture.............	3	All	None
68.	Home and School Gardening......	3	†Jr., sr.	None
	Advanced Courses			
131a,b.	Methods in Teaching High School Agriculture	3	†Sr.	11
151a,b.	Organization and Management....	3	†Sr.	68
161.	Fundamentals of Agriculture......	3	†Jr., sr.	None
162.	Fundamentals of Agriculture......	3	†Jr., sr.	None
171a,b.	Extension Work.................	3	†Sr.	None
173.	History of Agriculture..........	3	†Soph., jr., sr.	None
175a,b.	Visual Presentation.............	3	†Jr., sr.	None
181.	Agricultural Statistics and Graphic Representation	3	Soph., jr., sr.	None

† Offered only to those preparing to teach.

INTRODUCTORY COURSES

11a,b. Principles of Vocational Education. The fundamental principles upon which education is based. Emphasis is placed on those phases which are most closely related to industrial education. Dyer, Gile.

21. Vocational Education. A short history of vocational education; the present status in Europe and the United States; manual training, and home arts in an educational system; the place of agriculture in the public schools with special reference to Minnesota. Mayne.

41a,b. *Teaching. Observation of regular classes; interpretation of class practices; preparation of lesson plans and actual teaching of classes under careful supervision in recitation and laboratory; criticism and discussion of plans, methods, and results of student's teaching. Students are admitted to this course only when recommended by the faculty of the division in which they are specializing and when accepted by the Division of Agricultural Education. STORM, ANKENY, BARKER, FIELD, GILE.

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* Students who are prepared may be required to do their teaching in manual training.

63. GENERAL AGRICULTURE. For students specializing in such divisions as Agricultural Biochemistry, Economic Zoology, Plant Pathology, and in other colleges. A series of units by division chiefs and other agricultural specialists. STORM, BARKER, MAYNE.

64. GENERAL AGRICULTURE. Continuation of Course 63. Credit is given for either course separately but there is no duplication of subject matter and both should be taken to obtain a general knowledge of agriculture. STORM, ANKENY, MAYNE.

68. HOME AND SCHOOL GARDENING. Lecture and laboratory. The elements of horticulture as applied to high-school instruction, plant propagation, fruit growing, home gardening, school gardening, and the planning of home and school grounds. Same as Hort. 94. FIELD, BRIERLEY.

ADVANCED COURSES

131a,b. METHODS IN TEACHING HIGH-SCHOOL AGRICULTURE. Fundamental elements of method in teaching as related to teaching agriculture in high school. Organizing subject matter of daily work; selection and manipulation of devices. Classroom and laboratory method. Specific plans for teaching secondary agriculture. FIELD.

151a,b. ORGANIZATION AND MANAGEMENT. Organization and management of work in secondary schools, particularly of Minnesota, with special reference to agricultural work, courses of study, programs, equipment, laboratory and class management, extension work, plots, and coördination of work. STORM, DYER.

161. FUNDAMENTALS OF AGRICULTURE. Essential for principals and superintendents of schools in which agriculture is taught, and valuable for students of other colleges whose time for agriculture is limited. Agricultural college experts will give work in their special fields. STORM, BARKER.

162. FUNDAMENTALS OF AGRICULTURE. Continuation of Course 161. Credit is given for either course separately, but there is no duplication of subject matter and both should be taken to obtain a fundamental knowledge of agriculture. STORM, GILE.

171a,b. EXTENSION WORK. Federal, state, and local extension aims, organization. Assembling and use of extension data and equipment. Development of extension methods especially as applied to the work in Minnesota. STORM, BARKER, GILE.

173. History of Agriculture. A history of agricultural progress with special reference to the greater movements and to sources from which modern agriculture has received its most valuable acquisitions. Comparisons of our own agriculture with that of other countries. Dyer.

175a,b. Visual Presentation. Designed to prepare persons for presenting materials by means of slides, films, charts, etc. Students assisted in assembling materials for their own use and in acquiring skill and technique in preparation and operation of various mediums. Field.

181. Agricultural Statistics and Graphic Representation. Course teaches application of statistical methods to agriculture and different means of representing agricultural statistics graphically. Of value to all students to enable them to interpret, present, and use agricultural statistics and graphic representations. Barker.

AGRONOMY AND FARM MANAGEMENT

Professors Andrew Boss, Coates P. Bull; Associate Professors Albert C. Arny, Herbert K. Hayes; Assistant Professors Louis B. Bassett, Alva H. Benton, Ralph J. Garber, Francis W. Peck; Extension Specialists George J. Baker, William L. Cavert, Thomas B. McCullough, Clarence D. Patterson.

General statement.—For specialization in this department, see special requirements in Course of Study.

COURSES

No.	Title	Credits	Offered to	Prereq. courses
	Introductory Courses			
1a,b.	Farm Crops	3	Fr.	None
3b.	Farm Machinery	3	Sr.	None
7.	Farm Practices	None	Fr.	None
	Advanced Courses			
101b.	Farm Management I	3	Jr., sr.	1, Econ. 3
102a,b.	Farm Management II	3	Sr.	1, Econ. 3; An. Husb. 7 or 13; Soils, 2
*103.	Principles of Genetics	3	Jr., sr.	Bot. 1 yr., An. Biol. 1 yr.
*106.	Plant Breeding	3	Jr., sr.	103
107.	Cereal and Corn Crops	3	Jr., sr.	1, Bot. 1 yr.
108.	Farm Management III	3	Sr.	101, 102
110.	Forage, Fiber, Root, and Potato Crops	3	Jr., sr.	1, Bot. 1 yr.

* Open to any student of the University having the required prerequisites.

INTRODUCTORY COURSES

1a,b. Farm Crops. An elementary study of the important field crops of the United States with emphasis upon those of local importance; distribution, economic importance, agricultural classifications, cultural methods, and principles of improvement. ....

3b. FARM MACHINERY. Lectures, practical discussions, and practice work in the best methods of adjustment, handling, and adapting various kinds of machinery to the soils, weeds, and seasons. BASSETT.

7. FARM PRACTICES. A laboratory course designed to give training and experience in the elementary farm operations. BASSETT.

ADVANCED COURSES

101b. FARM MANAGEMENT I. Textbook and practice work in the art of record keeping, accounting, and kindred subjects. Designed especially for students expecting to become farm managers or farm-management field men. PECK.

102a,b. FARM MANAGEMENT II. A course in which the business side of farming is emphasized. Special attention is given to farm organization, equipment, and operation. BOSS, PECK.

103. PRINCIPLES OF GENETICS. Same as Hort. 109. Lectures and laboratory work designed to familiarize the student with the underlying principles of breeding. Heredity, variation, biometry, and evolution are emphasized. HAYES, DORSEY.

106. PLANT BREEDING. Same as Hort. 110. Applied genetics is emphasized. The method of breeding each of the important agricultural and horticultural crops with special attention to experiment station investigations and to the methods used by plant breeders. HAYES, DORSEY.

107. CEREAL AND CORN CROPS. An advanced study of cereal and corn crops. Structure, group classification, improvement, growing, and utilization. Typical samples of grain and those containing unsoundness are studied. Score card practice and comparative placing on intrinsic value included. ARNY.

108. FARM MANAGEMENT III. An advanced seminar course, including farm practices, farm equipment, cost of production, and efficiency of labor. BOSS, PECK.

110. FORAGE, FIBER, ROOT, AND POTATO CROPS. Laboratory and lecture work combined with assigned readings on the important forage, fiber, root, and potato crops. The study of each crop is followed by brief score card practice and comparative placing on intrinsic value. ARNY, WELLINGTON.

ANIMAL BIOLOGY

COLLEGE OF SCIENCE, LITERATURE, AND THE ARTS

Professors HENRY F. NACHTRIEB, THOMAS S. ROBERTS, CHARLES P. SIGERFOOS; Associate Professor HAL DOWNEY; Assistant Professors ELMER LUND, OSCAR W. OESTLUND; Instructors GEORGE D. ALLEN, CHARLES E. JOHNSTON, ADOLPH R. RINGOEN.

General statement.—Courses in this Department are closely correlated with those offered by the Division of Entomology and Economic Zoology of the College of Agriculture, Forestry, and Home Economics. For courses of that Division see page 48.

COURSES

No.	Title	Credits	Offered to	Prereq. courses
	Introductory Courses			
3-4.	General Zoology	6*	All	None
7-8.	Histology and Embryology	6*	Soph., jr., sr.	3-4
15-16.	General Physiology	6*	Soph., jr., sr.	12 cred. incl. 3-4, Chem. 3
19-20.	Comparative Gross Anatomy of Vertebrates	6*	Soph., jr., sr.	3-4
23-24.	Entomology	6*	Soph., jr., sr.	3-4
28.	Ornithology	3	Soph., jr., sr.	3-4
51.	Protozoology	3	Jr., sr.	9 cred. incl. 3-4
	Advanced Courses			
101-102.	Advanced Entomology	6	Jr., sr.	23-24 or equivalent
115-116.	Mammalogy	6	Jr., sr.	3-4, and 19-20 or equivalent
131-132.	Embryology	6	Jr., sr.	7-8
143-144.	Genetics and Eugenics	6	Sr.	3-4

For additional courses see the bulletin of the College of Science, Literature, and the Arts.

* Both semesters must be completed before credit is given.

INTRODUCTORY COURSES

3-4. General Zoology. A survey of the animal kingdom emphasizing the principles of development and structure in relation to functions and habit, heredity and evolution, and the animals of economic importance. Lectures, quizzes, and laboratory. Nachtrieb, Allen, Ringoen.

7-8. Histology and Embryology. A comparative microscopic study of the origin and structure of the tissues of vertebrates and invertebrates, and of the organs of mammals. Textbook, lectures, and laboratory. Downey.

15-16. General Physiology. Characteristic properties of living substance as shown by preparation and properties of typical biological compounds, colloids, enzyme action, growth, inanition, production of movements, heat, electricity, and light. Mechanisms and conditions of excitation and response. Lund.

19-20. Comparative Gross Anatomy of Vertebrates. Lower vertebrates. Dissection and study of selected types, cyclostomes to reptiles or birds inclusive; special consideration of history of organ systems. Mammalian anatomy. An intensive study of the cat. Textbook, laboratory guide. Lectures, laboratory, quizzes. Johnson.

23-24. Entomology. Elements of entomology leading up to discussion of the principles of taxonomy and their application to the classification of insects. Textbook, lectures, quizzes, and laboratory work. Oestlund.

28. Ornithology. The study of the structure, classification, and habits; special reference to birds of Minnesota. Considerable time devoted to field study. Bird or field-glasses and handbook required. Laboratory, lectures, quizzes. Class limited to 10. Roberts.

51. Protozoology. Lectures, reference, and laboratory work on the structure and life-histories of Protozoa, with special reference to the relations of the Protozoa to diseases of animals. Sigerfoos.

ADVANCED COURSES

101-102. Advanced Entomology. Advanced work in the ecology and taxonomy of insects. Lectures, laboratory, and field work. Oestlund.

115-116. Mammalogy. Structure and classification of North American mammals. The mammalian skeleton; its modifications, with consideration of our domestic animals; dissection of a typical mammal. Classification, natural history, and geographic distribution with special reference to Minnesota mammals. Johnson.

131-132. Embryology. A brief survey of general embryology, and the organogeny of the vertebrates with special reference to the circulatory system. Conference, reference, and laboratory work with Kellicott's *General Embryology* and *Outlines of Chordate Development* as texts. Nachtrieb.

143-144. Genetics and Eugenics. Facts and theories of heredity and the application of the laws governing natural inheritances for the improvement of a race. Lectures, reference, conference, and laboratory work. Nachtrieb.

ANIMAL HUSBANDRY

ANIMAL INDUSTRY GROUP

Professor Carl W. Gay; Assistant Professors Robert C. Ashby, Joseph S. Montgomery, Thomas G. Paterson; Instructors Philip A. Anderson.

COURSES

No.	Title	Credits	Offered to	Prereq. courses
	Introductory Courses			
1a,b.	Types and Breeds of Livestock....	3	Fr., soph.	None
3.	Market Classes of Livestock......	3	Soph., jr.	1
4.	Livestock Judging...............	1½	Soph., jr.	3
5.	Livestock Breeding..............	2	Sr.	*Vet. Sci. 6
6.	Horse Power....................	1	Soph.	1
7.	Livestock Feeding and Management	4	Sr.	An. Nutr. 1

* Not required of those specializing in Agricultural Education.

No.	Title	Credits	Offered to	Prereq. courses
9.	Meats	3	Sr.	4, An. Nutr. 1
13.	Elements of Feeding	4	Jr.	None
	Advanced Courses			
101.	Advanced Stock Judging	3	Sr.	4
104.	Horse Husbandry	2	Sr.	4, 5, 7
106.	Beef Cattle Husbandry	2	Sr.	4, 5, 7
108.	Sheep Husbandry	2	Sr.	4, 5, 7
110.	Swine Husbandry	2	Sr.	4, 5, 7
112.	Advanced Meats	5	Sr.	9
114.	Seminar	3	Sr.	7
116a,b.	Applied Swine Husbandry	1-3	Sr.	7, see statement

INTRODUCTORY COURSES

1a,b. Types and Breeds of Livestock. The types as related to performance or production in horses, beef cattle, sheep, and swine, and the origin, history, characteristics, and economic importance of the breeds, classified according to type. Gay.

3. Market Classes of Livestock. The market classes of cattle, sheep, and swine, and practice work in judging market classes. Paterson.

4. Livestock Judging. Practice in judging breeding classes of horses, beef cattle, sheep, and swine. Placings and reasons are submitted, followed by a general discussion with the instructor. Montgomery.

5. Livestock Breeding. The application of the principles of genetics to the breeding of livestock; a consideration of practical breeder's problems concluded by general pedigree work in the stud, herd, and flock books. Gay.

6. Horse Power. The horse as a motor; mechanics of locomotion; factors determining a horse's efficiency for work; the types and classes of horses adapted to the different kinds of horse labor. Gay.

7. Livestock Feeding and Management. Feeding livestock under farm conditions; equipment; management. Efficiency and economy in growing and fattening meat animals; feeding draft horses and colts. Consideration of experimental work and present practice. Practical feeding problems. Only two credits allowed to those who have completed Course 13. Ashby.

9. Meats. General course in the dressing of animals and the cutting of carcasses. Lectures and laboratory work. Anderson.

13. Elements of Feeding. A general course giving a brief survey of livestock and dairy feeding designed for those students not specializing in either animal or dairy husbandry. Not open to those who have completed Course 7 or Dy. Husb. 2. Ashby, Kildee.

ADVANCED COURSES

101. Advanced Stock Judging. Continuation of Course 4. The selection of breeding horses, beef cattle, sheep, and swine. Stock farms in the

vicinity of the Twin Cities visited in connection with this course. MONTGOMERY.

104. HORSE HUSBANDRY. The feeding, breeding, management, and marketing of horses. Studbook registration, pedigrees, and blood-lines with relation to breed improvement. Practicums dealing with breaking colts, stable management, and fitting for show purposes. MONTGOMERY.

106. BEEF CATTLE HUSBANDRY. The management of pure bred herds of beef cattle, building equipment, selection of foundation stock, methods of improvement, and marketing. Pedigrees, herd book registrations, and practicums. PATERSON.

108. SHEEP HUSBANDRY. The care and management of pure bred sheep, study of pedigrees, registrations, fitting for show purposes, marketing. Practicums in feeding, shearing, blocking, and caring for young lambs. PATERSON.

110. SWINE HUSBANDRY. Cost of producing pork; equipment; swine types; pure bred vs. market hogs; building a breeding herd; feeding; marketing breeding stock; herd management; pedigree studies; fitting and showing. Barn work and feeding practice. ASHBY.

112. ADVANCED MEATS. Continuation of Course 9. Particular attention is given the more important details concerning meat, its physical and chemical composition. PATERSON.

114. SEMINAR. Special problems and review of investigations pertaining to the livestock industry. GAY.

116a,b. APPLIED SWINE HUSBANDRY. Individual problems offering to those most interested in this phase of animal production opportunity for additional and specialized work. Admission only upon approval of instructor. ASHBY.

ANIMAL NUTRITION

ANIMAL INDUSTRY GROUP

Professors THEOPHILUS L. HAECKER, HENRY H. KILDEE; Assistant Professor ROBERT C. ASHBY.

COURSES

No.	Title	Credits	Offered to	Prereq. courses
	Introductory Course			
1.	Principles of Nutrition	3	Jr.	Vet. Sci. 2
	Advanced Course			
101.	Studies in Animal Nutrition	3	Sr.	1

INTRODUCTORY COURSE

1. PRINCIPLES OF NUTRITION. The principles of animal nutrition, their relation to the economic production of animal products, and the relation of the constituents in feed consumed to amount and character of products yielded. HAECKER, ASHBY, KILDEE.

ADVANCED COURSE

101. STUDIES IN ANIMAL NUTRITION. Analysis of the problem of animal nutrition; the relationship of food consumed to milk production; utilization of nutrients in beef and pork production; and the distribution in the body. HAECKER.

BEE CULTURE

Professor FRANCIS JAGER; Instructor LLOYD V. FRANCE.

General statement.—Theoretical and practical instruction on bees, honey, and wax production. At least one year of botany should be completed before electing these courses. General Zoology and Economic Entomology are also desirable. If not already completed they should be taken at same time as the courses in Bee Culture.

COURSES

No.	Title	Credits	Offered to	Prereq. courses
	Introductory Courses			
6.	Elements of Beekeeping...............	3	Jr., sr.	None
7.	Advanced Beekeeping..................	3	Jr., sr.	6

INTRODUCTORY COURSES

6. ELEMENTS OF BEEKEEPING. Elementary study of queens, drones, and workers, hives and appliances, handling of bees, spring, summer, winter management, swarming and increase, honey and wax production, feeding and bee diseases. JAGER, FRANCE.

7. ADVANCED BEEKEEPING. Anatomy of the bee, queen rearing, commercial production of honey, out apiaries, accounting and marketing. JAGER, FRANCE.

BOTANY

COLLEGE OF SCIENCE, LITERATURE, AND THE ARTS

Professors CARL OTTO ROSENDAHL, JOSEPHINE E. TILDEN, ...; Assistant Professors FREDERIC K. BUTTERS, NED L. HUFF; Instructor WILLIAM S. COOPER; Teaching Fellows HORACE GUNTHORP, PAUL A. HARVEY, ARTHUR M. JOHNSON, VINNIE A. PEASE; Assistant LOIS CLARK.

COURSES

No.	Title	Credits	Offered to	Prereq. courses
	Introductory Courses			
1a,b.	General Botany..................	3	All	None
2a,b.	General Botany..................	3	All	1 or equivalent

No.	Title	Credits	Offered to	Prereq. courses
5a,b.	Morphology of Land Plants	3	All	2
8.	Taxonomy	3	All	2
9-10.	Physiology and Ecology	6	Soph., jr., sr.	2
17.	Anatomy and Histology	3	Soph., jr., sr.	2
	Advanced Courses			
107.	Mosses and Liverworts	3	Jr., sr.	5
108.	Pteridophytes	3	Jr., sr.	5, 17
111-112.	Advanced Taxonomy	6	Jr., sr.	9 credits incl. 8
113.	Field Ecology	3	Jr., sr.	9-10
114.	Forest Geography of N. America	3	Jr., sr.	9-10
115-116.	Advanced Plant Physiology	6	Jr., sr.	9-10
117-118.	Cytology	6	Jr., sr.	12 credits
119-120.	Advanced Industrial Botany	6	Jr., sr.	11-12
123.	Taxonomy and Morphology of Freshwater Algae	3	Jr., sr.	9 credits

For additional courses see the bulletin of the College of Science, Literature, and the Arts.

INTRODUCTORY COURSES

1a,b. GENERAL BOTANY. A study of the external form, microscopic structure, and functions of the organs of flowering plants. ...., BUTTERS, COOPER, HUFF.

2a,b. GENERAL BOTANY. A comparative study of selected types of plants, illustrating the evolution of plants from the simplest forms to the flowering plants. ...., BUTTERS, COOPER, HUFF.

5a,b. MORPHOLOGY OF LAND PLANTS. A comparative study of the form, structure, and life history of liverworts, mosses, ferns, and seed plants. BUTTERS, HUFF.

8. TAXONOMY. A general study of the classification and relationships of flowering plants. Laboratory and field practice in the determination of species, together with lectures and quizzes. ROSENDAHL.

9-10. PHYSIOLOGY AND ECOLOGY. Greenhouse study of the growth and behavior of plants, and field study of plant communities and their environment in fall and spring. COOPER.

17. ANATOMY AND HISTOLOGY OF VASCULAR PLANTS. A study of the microscopic structure of vascular plants, the cell, tissues, and tissue systems with particular attention to the development and evolution of the vascular system in the root, stem, and leaf. BUTTERS.

51-52. MORPHOLOGY AND HISTOLOGY OF ECONOMIC PLANTS. A study of plants yielding products of economic value. Not given in 1918-19. TILDEN.

ADVANCED COURSES

107. COMPARATIVE MORPHOLOGY OF LIVERWORTS AND MOSSES. Designed for students who wish to pay special attention to the morphology and

taxonomy of bryophytes. Lectures, laboratory, and field work. BUTTERS.

108. MORPHOLOGY AND TAXONOMY OF PTERIDOPHYTES. A comparative study of lycopods, ferns, and their allies, their structure and history with special attention to the classification of living forms. Lectures, reference reading, and laboratory work. BUTTERS.

110. MORPHOLOGY AND TAXONOMY OF GYMNOSPERMS. A comparative study of cycads, conifers, and their allies, their structure and history with special attention to the classification of living forms. Lectures, reference reading, and laboratory work. Not given in 1918-19. BUTTERS.

111-112. ADVANCED TAXONOMY. An advanced course in which special attention is given to the taxonomy of difficult natural groups involving systematic principles and practice, rules of nomenclature, systems of classification, etc. ROSENDAHL.

113. FIELD ECOLOGY. Field study of the plant communities and successions of the Minneapolis region, followed by a detailed written report, and by a study of the general principles of plant association and succession. COOPER.

114. FOREST GEOGRAPHY OF NORTH AMERICA. Preliminary discussion of the principles of plant distribution, followed by a detailed study of the forest regions of North America, by means of reading, discussion, lantern slides, distribution maps, microscopic work, written reports. Should be preceded by Field Ecology, but not necessarily. COOPER.

115-116. ADVANCED PLANT PHYSIOLOGY. The interrelations of factor, function, and structure with special reference to the food cycle (photosynthesis, respiration, and growth). Discussions, quizzes, and greenhouse work. ....

117-118. CYTOLOGY. A survey of cell structure and the various phenomena of division, fusion, and metamorphosis, together with a review of the history of cytological investigation. Methods of cytological research indicated in the laboratory. ROSENDAHL.

119-120. ADVANCED INDUSTRIAL BOTANY. A study of the origin, distribution, and cultivation of plants yielding products of economic value; the nature and uses of these products and the processes by which they are obtained from the plants. TILDEN.

123. TAXONOMY AND MORPHOLOGY OF FRESH-WATER ALGAE. A study of living forms, based on collections made by the class. TILDEN.

CHEMISTRY

SCHOOL OF ANALYTICAL AND APPLIED CHEMISTRY

Professors George B. Frankforter,* Edward E. Nicholson, Charles F. Sidener; Associate Professor Sterling Temple;* Assistant Professors Ross A. Baker,* Frank H. MacDougall; Instructors Isaac W. Geiger, Carl L. Schumann, Woldemar M. Sternberg, H. Lee Ward.

COURSES

No.	Title	Credits	Offered to	Prereq. courses
	Introductory Courses			
3a-4b, 3b-4a.	Adv. General Chem. and Qualitative Analysis	6*	Fr., soph., jr.	Entrance cred. in Chem.
11-12.	Quantitative Analysis	8*	Soph., jr., sr.	3-4
33.	General Chem. and Qualitative Analysis	5†	Fr., soph., jr.	None
35-36.	Organic Chemistry	8	Soph., jr., sr.	3-4
	Advanced Courses			
121-122.	Physical Chemistry	4*	Jr., sr.	36, Phys. 2 and 4
123-124.	Physico-Chemical Laboratory	2*	Jr., sr.	See statement

For additional courses see the bulletin of the School of Chemistry.

* Both semesters must be completed before credit is given for the first semester.

† Course 4b must be completed before credit is given.

INTRODUCTORY COURSES

3a-4b, 3b-4a. Advanced General Chemistry and Qualitative Analysis. Lectures, recitations, and laboratory work. General descriptive chemistry, including the fundamental theories and laws, and qualitative analysis. Nicholson, Baker, Ward.

11-12. Quantitative Analysis. General discussion of quantitative methods, with laboratory work in gravimetric analysis, first semester, followed by a discussion of standard solutions and the necessary stoichiometric calculations, with laboratory work in volumetric analysis, second semester. Sidener, Geiger, Sternberg.

33. General Chemistry and Qualitative Analysis. Designed for those who have had no high-school chemistry; in preparation for Course 4b. See statement under 3a-4b. Baker.

35-36. Organic Chemistry. This course includes the aliphatic and the aromatic series with the preparation of the more important compounds. Frankforter, Schumann.

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* On leave of absence, 1918-19.

ADVANCED COURSES

121-122. PHYSICAL CHEMISTRY. A consideration of the theories and laws, phenomena and processes which form the basis of chemical science. Charts, models, and experiments are employed to supplement and illustrate the discussions. MACDOUGALL.

123-124. PHYSICO-CHEMICAL LABORATORY PRACTICE. Open only to students pursuing Course 121-122 or who have had it or its equivalent. Physico-chemical methods and measurements. MACDOUGALL.

DAIRY HUSBANDRY

ANIMAL INDUSTRY GROUP

Professors HENRY H. KILDEE, ROBERT M. WASHBURN; Assistant Professor G. EARL WEAVER; Instructors EDWIN O. HANSON, HAROLD R. SEARLES; Assistants DAVID C. BERG, LESLIE V. WILSON;* Extension Specialists ARTHUR J. MCGUIRE, WILLIAM A. MCKERROW.

COURSES

No.	Title	Credits	Offered to	Prereq. courses
	Introductory Courses			
2.	Dairy Stock Feeding and Management	3	Jr., sr.	Nutr. 1
4.	Dairy Stock Judging	1½	Soph.	7
5.	Factory Management	3	Jr., sr.	11
6.	Factory Butter Making	3	Jr., sr.	11
7a,b.	Elements of Dairy Husbandry	3	Fr.	None
9.	Cheese Making Practice	3	Jr., sr.	11
10.	Creamery Practice	2	Jr., sr.	11
11.	Milk and Its Products	3	Soph., jr.	7
12.	Dairy Cattle Feeding	1	Jr., sr.	Nutr. 1, or parallel
	Advanced Courses			
101.	Seminar	2	Sr.	2, 4, 11
102.	Advanced Study of Dairy Breeds	3	Jr., sr.	4
104.	Special Problems	3	Jr., sr.	2, 4, 11

INTRODUCTORY COURSES

2. DAIRY STOCK FEEDING AND MANAGEMENT. Characteristics and values of concentrates, roughages, and succulent feeds for efficient and economical milk production. Also shelter, care, and management of different classes of dairy stock. Barn plan. Only two credits allowed to those who have completed Course 12 or An. Husb. 13. KILDEE.

4. DAIRY STOCK JUDGING. Relation of form to function. Practice work in comparative judging of dairy cattle of different breeds and ages. Herds in the vicinity of the Twin Cities are visited. KILDEE, SEARLES.

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* On leave of absence, 1918-19.

5. Factory Management. Organization of Creamery Associations, the construction and equipment of factories, with lectures on calculating dividends, sinking fund, locating financial leaks, and marketing. Washburn.

6. Factory Butter Making. The separation of milk, preparation of pure culture starters, cream ripening, churning, controlling composition of butter, market requirements, and scoring of butter. Washburn, Hanson.

7a,b. Elements of Dairy Husbandry. Origin, characteristics and adaptations of the dairy breeds of cattle. Beginning judging. Milk, its composition and testing. Cream separation and buttermaking. Washburn, Hanson, Weaver.

9. Cheese Making Practice. A minimum of one month's experience in an approved practical cheese factory is required of all students specializing in dairy manufacture. Records are kept and reports made of work. Washburn.

10. Creamery Practice. One month's experience in an approved practical creamery is required of all students specializing in dairy manufacture. Records are kept and reports made of the work. Washburn.

11. Milk and Its Products. Milk secretion, composition, properties, variation, and testing. Cream separation, testing, care, methods of marketing. Butter, cheese, and ice cream making. Market milk handling, standardizing, clarifying, pasteurizing, bottling, and marketing. Washburn, Hanson.

12. Dairy Cattle Feeding. Characteristics and relative merits of concentrates, roughages, and succulent feeds for efficient and economical production. Not open to those who have completed Course 2 or An. Husb. 13. Weaver.

ADVANCED COURSES

101. Seminar. Survey of the recent developments in the field of dairy husbandry. Papers and discussion. Kildee.

102. Advanced Study of Dairy Breeds. Origin, history, and characteristics of the more important strains and families of the leading breeds of dairy cattle. Judging and pedigree work. Herds near the Twin Cities are visited. Kildee.

104. Special Problems. Individual studies and reports upon definite problems connected with dairy husbandry either in the field of production or manufacture. Kildee, Washburn.

ECONOMICS

COLLEGE OF SCIENCE, LITERATURE, AND THE ARTS

Professor Willard E. Hotchkiss; Assistant Professors John D. Black, Roy G. Blakey, William W. Cumberland, J. Franklin Ebersole, Edwin Clyde Robbins; Instructors Albert C. Hodge, Albert C. James, J. Warren Stehman.

COURSES

No.	Title	Credits	Offered to	Prereq. courses
	Introductory Courses			
†2a,b.	Industries and Commerce of the United States	3	Fr., soph.	None
†3a,b.	Principles of Economics	3	Soph., jr., sr.	None
4.	Economic Problems	3	Soph., jr., sr.	3
†18.	Problems in Agr. Economics	3	Soph., jr., sr.	3
†19.	Marketing of Farm Products	3	Jr., sr.	3
35-36.	Accounting Principles	6*	Soph., jr., sr.	None
41.	Financial History	3	Soph., jr., sr.	3
43.	Banking	3	Soph., jr., sr.	3
52.	Corporation Finance	3	Jr., sr.	6 credits incl. 3
59.	Insurance	3	Jr., sr.	3-4
76.	Commercial Policies	3	Jr., sr.	6 credits incl. 3
85.	Marketing	3	Jr., sr.	3-4
86.	Advertising and Selling	3	Jr., sr.	3-4 with 85 suggested
88.	Retail Marketing	3	Jr., sr.	6 credits incl. 85
	Advanced Courses			
101.	Statistics	3	Jr., sr.	6 credits incl. 3
102.	Advanced Statistics	3	Jr., sr.	101
†107.	Land Tenure	3	Jr., sr.	18 or 4
†108.	Agricultural Statistics	3	Jr., sr.	101
†118.	Advanced Problems in Agricultural Economics	3	Jr., sr.	18 or 4
†119-120.	Seminar in Agr. Economics	6*	Sr.	‡9 cr. in Agr. Econ.
123.	Business Organization and Management	3	Jr., sr.	3-4
124.	Business and Government	3	Jr., sr.	3-4
131.	Cost Accounting	3	Jr., sr.	35-36
133-134.	Auditing	6*	Jr., sr.	135-136
135-136.	Accounting Problems	6*	Jr., sr.	35-36
139.	Bank Administration	3	Jr., sr.	43
142.	Investments	3	Jr., sr.	6 credits
143.	Money and Prices	3	Jr., sr.	3, 41 or 43
144.	Business Cycles	3	Jr., sr.	43
151-152.	Seminar in Business Policy	6*	Sr.	‡123, 3 cr. in courses above 50
161.	Labor Problems	3	Jr., sr.	6 credits incl. 3
173.	Railway Problems	3	Jr., sr.	6 credits incl. 3
191.	Public Finance	3	Jr., sr.	6 credits incl. 3
192.	State and Local Taxation	3	Jr., sr.	191
195-196.	Seminar in Finance	6*	Sr.	‡12 credits

* Both semesters must be completed before credit is given for the first semester.

† Given at University Farm.

†‡ Admission conditioned also on approval of instructor.

INTRODUCTORY COURSES

2a,b. Industries and Commerce of the United States. An introductory study of modern industry as a foundation for the further study of economics. Land, labor, capital, enterprise, as divisions of the productive process. Exchange. Ways in which society influences production. Robbins.

3a,b. Principles of Economics. Fundamentals of economic theory with special reference to agriculture. Black.

4. Economic Problems. A survey of the fundamentals in the problems of labor, social insurance, socialism, government ownership, corporations, trusts, monopolies, transportation, banking, protection, free trade, public revenues and expenditures. Blakey, Cumberland, Stehman.

18. Problems in Agricultural Economics. The economic facts and principles underlying the practical problems confronting the farmer as producer, consumer and citizen, such as what to produce, intensity of cultivation, farm labor, tenancy, land settlement, farm credit, marketing, taxation. Black.

19. Marketing of Farm Products. The organization and methods of marketing; the functions of middlemen; the costs of marketing various products; coöperative marketing. Cumberland.

35-36. Accounting Principles. Purposes of accounts and principles of account classification; capital and revenue; accruals; principles of valuation; depreciation; preparation and interpretation of balance sheets, income accounts, and other business statements; corporation accounts. Laboratory course with supplementary lectures. Hodge.

41. Financial History of the United States. American monetary and fiscal legislation from colonial times with especial emphasis upon the distinction between maintaining a standard of value and the providing of a revenue for the needs of government. Blakey.

43. Principles and Practice of Banking. Contemporary banking institutions, both national and state; their incorporation, organization, administration; reserves, note issues, clearing houses, domestic and foreign exchange; the banking systems of foreign countries; and the Federal Reserve Banks of the United States. Stehman.

52. Corporation Finance. The organizing, financing, and managing of corporations. The relation of the government to the corporation. The operations of the stock exchange and a study of corporate securities for purposes of investment and speculation. Stehman.

59. Insurance. Principles of insurance with special reference to fire, life, and accident insurance. Critical examination of policy contracts, the premium, reserve, and rights and obligations of policy holders. Public regulation of insurance companies. James.

76. Commercial Policies. Theory of international commerce; free trade, reciprocity, and protection, with special emphasis on the tariff history and policy of the United States; commercial treaties and foreign politics. Lectures, assigned readings, and reports. Blakey.

85. Marketing. Domestic merchandising methods of manufacturers. Problems of wholesalers and commission men; distributing system and market organizations; price policies. James.

86. Advertising and Selling. Functions and principles of advertising; advertising media; planning and executing an advertising campaign. Copy. Sales management and personal salesmanship. James.

88. Retail Marketing. Problems and methods of the so-called regular retailer, department stores, and chain stores. Development of retail trade centers. Coöperation between the retailer and the local board of trade. The retailer and the consumer. James.

ADVANCED COURSES

101. Statistics. Principles of collection, tabulation, and interpretation of statistical material, illustrated by present-day statistical data. Lectures, assigned readings, and special investigations by individual members of the class. ....

102. Advanced Statistics. A continuation of Course 101, dealing with more advanced problems connected with assembling, tabulating, interpreting, and using statistical information. As far as practicable the data used in this course will be drawn from business. ....

107. Land Tenure. A study of several problems arising out of the land basis of civilization, such as property in land, land utilization, land classification, land settlement, status of the agricultural classes, farm labor, farm ownership, and tenancy. Black.

108. Agricultural Statistics. Study and practice of the special methods of statistical investigation, analysis and presentation which have been developed for agriculture, together with descriptive statistics of agriculture. Black.

118. Advanced Problems in Agricultural Economics. A close study of the fundamental principles of consumption, production and value and distribution as pertaining to agriculture. Cumberland.

119-120. Seminar in Agricultural Economics. An advanced research course in which certain topics in agricultural economics will be taken up for intensive individual study. Black, Cumberland.

123. Business Organization and Management. Organization: Principles applying to business in general and to particular concerns; evolution, objects, adjustments, limits, functional division. Specialization: functional and other forms. Standardization. Management: coördi-

nation of functions, handling of men, employment, external vs. internal factors. HOTCHKISS.

124. BUSINESS AND GOVERNMENT. Business expansion, diversification, and conflicting interests. Laissez faire vs. regulation. Enforcement of minimum standards. Administration of business legislation. Coöperation between government and business. Public coördination of business forces. Reaction of emergency measures on permanent policy. HOTCHKISS.

131. COST ACCOUNTING. Elements and classification of production cost; methods of recording materials, labor and machine costs, and apportioning indirect expenses; relation of cost to general accounts; use of cost data to enforce efficiency of operation. HODGE.

133-134. AUDITING. Preparation for, and conduct of, an audit; the auditor's report and certification, and legal responsibilities. Textbook, assigned readings, class discussions, and lectures. ....

135-136. ACCOUNTING PROBLEMS. A study of the preparation of business and financial statements, chiefly from the standpoint of administrative statistics; based on problems from C. P. A. examinations and other sources. HODGE.

139. BANK ADMINISTRATION. The modern commercial bank from the manager's point of view. Legal problems, department functions, profit-making methods, credits. Adjustment of bank policy to prospective business conditions. Lectures, and laboratory work in local banks. EBERSOLE.

142. INVESTMENT AND SPECULATION. The social process of saving and investment; government, municipal, corporation, and real estate loans; stock exchange operations and money market influences as they affect the prices and net yield of prime securities. EBERSOLE.

143. MONEY AND PRICES. The functions of money; the nature of credit; changes in general prices, their causes and effects; international movements of gold; monetary standards and currency systems; the problem of securing an ideal money. EBERSOLE.

144. BUSINESS CYCLES. American business conditions since 1890 with regard to the great cycles of alternate prosperity and depression and financial panics. Critical examination of all the available business barometers designed to forecast similar conditions. EBERSOLE.

151-152. SEMINAR IN BUSINESS POLICY.

161. LABOR PROBLEMS. Modern labor problems; woman and child labor, industrial education, unemployment, poverty, industrial hygiene, welfare work, profit sharing, coöperation, labor unions, strikes, boycotts, conciliation and arbitration; economic causes and effects of immigration. ROBBINS.

173. RAILWAY PROBLEMS. The theory and practice of railway rate making. Railway organization and finance viewed historically and scientifically. Government regulation, the conflict between state and federal authorities and suggested improvements in railway control. STEHMAN.

191. PUBLIC FINANCE. Public expenditures; public debt; budgetary legislation; tax systems. BLAKEY.

192. STATE AND LOCAL TAXATION. Problems of state and local taxation. Historic survey of various taxes and examination of present procedure in taxing different kinds of property; tax reforms. Particular attention given to conditions in Minnesota. BLAKEY.

195-196. SEMINAR IN FINANCE. ....

EDUCATION

COLLEGE OF EDUCATION

Professors LOTUS D. COFFMAN, FLETCHER H. SWIFT; Assistant Professor MARVIN J. VAN WAGENEN; Instructor JEAN H. ALEXANDER.

COURSES

No.	Title	Credits	Offered to	Prereq. courses
	Introductory Courses			
1a,b.	Brief Course in the Hist. of Educ..	3	Jr., sr.	Psychol. 1-2
*5.	The American School............	3	Jr., sr.	Psychol. 1
11a,b.	Technique of Teaching..........	3	Jr., sr.	Psychol. 1-2
	Advanced Courses			
101.	Historical Foundations of Modern Education	3	Jr., sr.	Psychol. 1-2, Hist. 6 cred.
102.	History of Educ. since Reformation	3	Jr., sr.	1 or Psychol. 1-2, Hist. 6 cred.
105.	Educational Psychology	3	Sr.	Psychol. 1-2
106.	Educational Psychology	3	Sr.	Psychol. 1-2
109.	Educational Diagnosis	2	Sr.	1 or 101-102, 3
125.	Methods in Educational Research..	3	Sr.	1 or 101-102, 3

* Given at the University Farm.
For additional courses see the bulletin of the College of Education.

INTRODUCTORY COURSES

1a,b. A BRIEF COURSE IN THE HISTORY OF EDUCATION. Current school problems and educational theories in the light of their history. Emphasis upon secondary education and those aspects of education of most immediate concern to high-school teachers. Not open to those who have credit in Course 5. SWIFT, ALEXANDER.

5. AMERICAN SCHOOL. A brief survey of the factors determining the problem of public education in America, followed by a brief account of

the development and organization of typical state school systems. Not open to those who have credit in Course 1. SWIFT.

11a,b. TECHNIQUE OF TEACHING. Types of classroom exercises; preparation of teaching plans; hygiene of instruction; classroom management; the professional ethics of teaching; observation of high-school work. ....

ADVANCED COURSES

101. FOUNDATIONS OF MODERN EDUCATION. Interpretative historical study of elements in modern education derived from Hebrews, Greeks, Romans, Middle Ages, Renaissance. Emphasis upon secondary and higher education and origin and results of monopoly of cultural conception of education and cultural studies. SWIFT.

102. HISTORY OF EDUCATION SINCE THE REFORMATION. Modern educational institutions, theories, and problems in the light of their history. Special emphasis upon elementary education. SWIFT.

105. EDUCATIONAL PSYCHOLOGY. Advanced work in genetic psychology, the origin and nature of the human organism, the origin, development, and control of instincts, the relation of instincts to the formation of habits, introductory to the psychology of learning. VAN WAGENEN.

106. EDUCATIONAL PSYCHOLOGY. Psychology of learning. Methods of measuring rate of learning; study of typical learning experiments and examination of the conditions of the most economic learning, study of individual differences, and psychology of the school subjects. VAN WAGENEN.

109. EDUCATIONAL DIAGNOSIS. A study of educational scales and standard tests for measurement of efficiency in school subjects. The course will deal with the nature of the tests, methods of their use, and an analysis of results obtained. ....

125. METHODS IN EDUCATIONAL RESEARCH. A study of statistical and other methods as applied to educational investigation. This course is ordinarily required of all candidates for advanced degrees. COFFMAN.

ENTOMOLOGY AND ECONOMIC ZOOLOGY

Professors WILLIAM A. RILEY, FREDERIC L. WASHBURN; Associate Professors WILLIAM MOORE, ARTHUR G. RUGGLES; Assistant Professors OSCAR W. OESTLUND, ROYAL N. CHAPMAN; Assistants SAMUEL A. GRAHAM, WARREN WILLIAMSON.

General statement.—For specialization in this department see Course of Study. Courses in this department are closely correlated with those offered by the Department of Animal Biology of the College of Science, Literature, and the Arts. Courses 23-24, 35, 36, 101-102, 103, 105-106, 107-108, of this Division are also offered under these numbers by the Department of Animal Biology.

COURSES

No.	Title	Credits	Offered to	Prereq. courses
	Introductory Courses			
1-2.	Introductory Entomology	6	Soph., jr., sr.	An. Biol. 3-4 or equivalent
3.	Elementary Econ. Entomology	3	Soph., jr.	An. Biol. 3-4
4.	Econ. Vertebrate Zoology	3	Jr., sr.	1-2 or 23-24
5.	Elementary Forest Entomology	3	Jr.	An. Biol. 3-4
9.	Animal Parasites	3	Jr., sr.	An. Biol. 3-4
12.	Forest Zoology	2	Jr., sr.	3, An. Biol. 3-4
14.	Insects and Public Health	2	Jr., sr.	An. Biol. 3-4
16.	Plant Pest Control	3	Jr., sr.	1 or 3, Pl. Path. 1
23-24.	General Entomology	6	Soph., jr., sr.	An. Biol. 1-2 or 3-4
35.	Animal Parasites and Parasitism	3	Soph., jr., sr.	An. Biol. 1-2 or 3-4
36.	Relation of Insects to Disease	3	Soph., jr., sr.	1 or 23, 35
	Advanced Courses			
101-102.	Advanced General Entomology	6	Jr., sr.	1-2 or 23-24
103.	Biology and Taxonomy of Aphididae	3	Sr.	1-2 or 23-24
105-106.	Histology and Development of Insects	6	Jr., sr.	1-2 or 23-24; An. Biol. 7-8 advised
107-108.	General Ecology of Insects	6	Jr., sr.	1-2 or 23-24
111-112.	Insecticides and Their Action	3 or 6	Jr., sr.	1-2 or 23-24; Agr. Bioch. 7-8 or equiv.
117.	Methods of Economic Entomology	3	Jr., sr.	101-102
119-120.	Introduction to Research	6 or more	Sr.	1-2 or 23-24 and additional requirements, according to line of specialization

INTRODUCTORY COURSES

1-2. INTRODUCTORY ENTOMOLOGY. Lectures and laboratory work on the characteristics and habits of insects. The more important insect pests and methods of control are especially emphasized in the second semester. OESTLUND, RUGGLES.

3. ELEMENTARY ECONOMIC ENTOMOLOGY. A brief course dealing with the characteristics and habits of insect pests and beneficial insects and methods of control. Not open to students planning to specialize in entomology. RUGGLES, GRAHAM, WILLIAMSON.

4. ECONOMIC VERTEBRATE ZOOLOGY. Relation of birds and other wild animals to agriculture. Lectures, laboratory, field work. Identification and studies of Minnesota birds and wild animals affecting the horticulturist and agriculturist, methods of combating injurious and conserving useful forms. WASHBURN.

5. ELEMENTARY FOREST ENTOMOLOGY. A study of the life histories and methods of controlling insects affecting shade and forest trees. Not

open for credit to students specializing in entomology. Given in alternate years. Not offered in 1918-19. RUGGLES, GRAHAM.

9. ANIMAL PARASITES. A study of the more common animal parasites of man and domestic animals, and of methods of avoidance and control. Not open to students specializing in entomology. (See Course 35.) RILEY.

12. FOREST ZOOLOGY. Forest Animals. Relation of birds and of various four-footed animals to forest protection. Habits, range, usefulness; the manner of protecting the important large and small game, fish, and birds; fish culture. WASHBURN.

14. INSECTS AND PUBLIC HEALTH. The agency of insects and related forms in the transmission of disease; methods of sanitation related to their control and disease transmission. Not open for credit to students specializing in entomology. (See Courses 35-36.) RILEY.

16. PLANT PEST CONTROL. Same as Pl. Path. 6. The theory and practice of control of insect and fungous pests of crop plants. Practical applications. Not open to those who have completed Pl. Path. 14. RUGGLES, BISBY, STAKMAN.

23-24. GENERAL ENTOMOLOGY. A more extended course than 1, leading up to discussion of the principles of taxonomy and their application to the classification of insects. Textbook, lectures, quizzes, and laboratory. OESTLUND.

35. ANIMAL PARASITES AND PARASITISM. Lectures and laboratory work. A consideration of the origin and biological significance of parasitism, and of the structure, life history, and economic relations of representative animal parasites. Methods of control and prevention will be emphasized. RILEY.

36. RELATIONS OF INSECTS TO DISEASE. The causation and transmission of disease by insects and other arthropods. Life history, habits, and methods of control of hominoxious species. RILEY.

ADVANCED COURSES

101-102. ADVANCED GENERAL ENTOMOLOGY. Advanced work in the lines of morphology and classification of insects with lectures on the history of entomology. Lectures and laboratory. OESTLUND.

103. BIOLOGY AND TAXONOMY OF THE APHIDIDAE. Intensive study of the natural history, bibliography, and classification of the Aphididae. OESTLUND.

105-106. HISTOLOGY AND DEVELOPMENT OF INSECTS. Lectures and laboratory work on the histology, embryonic and postembryonic development of insects. RILEY.

107-108. GENERAL ECOLOGY OF INSECTS. General ecology with special reference to the insects of Minnesota. Frequent field trips. Lectures, laboratory, and field work. CHAPMAN.

111-112. INSECTICIDES AND THEIR ACTION. A study of the chemical composition, the physical properties, and the physiological action of standard, of little known, and of new insecticides. MOORE.

117. METHODS IN ECONOMIC ENTOMOLOGY. Identification of immature stages of insects; methods of breeding; insect photography; insecticides; bibliographic aids and sources of literature. RUGGLES, MOORE.

119-120. INTRODUCTION TO RESEARCH. Preparation for investigational work in lines of entomology, parasitology, or economic zoology. Advanced laboratory, field and library work; training in the preparation of bibliographies and manuscripts; special problems. Summer work should be planned when possible. Oestlund, Systematic Entomology; Ruggles, General Economic Entomology; Chapman, Insect Ecology; Moore, Insecticides; Riley, Parasitology; Insect Morphology; Washburn, Economic Vertebrate Zoology.

FARM ENGINEERING

Professors JOHN T. STEWART,* IRVING D. CHARLTON (Acting Chief); Associate Professor JASON L. MOWRY; Assistant Professors HARRY B. ROE, ARTHUR G. TYLER; Instructors ALLEN D. JOHNSTON, JAMES B. TORRANCE, HALL B. WHITE.

COURSES

No.	Title	Credits	Offered to	Prereq. courses
	Introductory Courses			
3a,b.	Mechanical Drawing	3	All	None
4.	Blacksmithing	3	All	None
5.	Carpentry	3	All	None
7.	Farm Structures	3	Jr., sr.	3
10.	Farm Engineering	3	Soph., jr., sr.	21-22 or H. S. Physics (1 unit)
11a,b.	Applied Mathematics	3	All	None
13a,b.	Farm Motors	3	All	None
15.	Farm Repairs	2	All	None
17.	Advanced Blacksmithing	3	All	4
18.	Surveying	3	Soph., jr., sr.	3, 11
19.	Materials of Construction	2	Soph., jr., sr.	None
21-22.	Agricultural Physics	6	All	None
24.	Advanced Farm Motors	3	Jr., sr.	13
26.	Farm Drainage	3	Jr., sr.	18
28.	Land Clearing	1	Soph., jr., sr.	None

INTRODUCTORY COURSES

3a,b. MECHANICAL DRAWING. Mechanics of drawing. Exercises in the use of drawing instruments, lettering, and water colors. The mechanics of working drawings with their practical value. TYLER.

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* On leave of absence, 1918-19.

4. BLACKSMITHING. The managment of forge and fire in bending, shaping, and welding iron. JOHNSTON.

5. CARPENTRY. The use of carpentry tools and methods of farm building construction. WHITE.

7. FARM STRUCTURES. The planning, designing, and location of farm buildings including specifications and estimates of cost. TYLER.

10. FARM ENGINEERING. A general course in farm engineering. Lectures on farm measurements, drainage, irrigation, sanitation, buildings, roads, power, and machinery. CHARLTON.

11a,b. APPLIED MATHEMATICS. Rules of practical mathematics with special attention to formulas and problems directly related to agricultural work; e.g., areas, volumes, percentages, proportions, variations, investments, cost problems, etc. ROE.

13a,b. FARM MOTORS. Theory, operation, care, and repair of gasoline engines. TORRANCE.

15. FARM REPAIRS. Exercises in harness repair, knots and rope splicing, belt lacing, soldering, babbitting, pipe fitting, drilling, and work with cold metals. ....

17. ADVANCED BLACKSMITHING. Bending, shaping, welding, and tempering of steel. JOHNSTON.

18. SURVEYING. Plain surveying as applied to farm problems. Mensuration, leveling, simple grade determination, elements of topography, and farm mapping. ROE.

19. MATERIALS OF CONSTRUCTION. Wood, concrete, clay and metal products—their physical properties and preparation for farm buildings and equipment. ....

21-22. AGRICULTURAL PHYSICS. Mechanics of solids and fluids, sound and heat, light, electricity, and magnetism, and their application to farm problems. ....

24. ADVANCED FARM MOTORS. Farm tractors, trucks, and automobiles, their care, repair, and operation. MOWRY.

26. FARM DRAINAGE. Principles and practice of farm drainage. Field technique of drainage construction by hand and machine. This course is for students wishing to do special work in drainage. ROE.

28. LAND CLEARING. A study of land clearing methods, explosives, and machinery. CHARLTON.

FORESTRY

Professor EDWARD G. CHEYNEY; Associate Professor JOHN P. WENTLING.

COURSES

No.	Title	Credits	Offered to	Prereq. courses
	Introductory Courses			
1.	General Forestry	3	All	None
21.	Farm Forestry	3	Jr.	None

For additional courses see the bulletin of the Courses in Forestry.

INTRODUCTORY COURSES

1. GENERAL FORESTRY. A brief history of the development of forestry in Europe and America; description of the United States forests. Lectures and collateral reading. CHEYNEY.

21. FARM FORESTRY. A study of the establishment, care, maintenance, and utilization of the farm woodlot and windbreaks. A sketch of the forestry work in Minnesota and the United States. CHEYNEY, WENTLING.

GEOLOGY AND MINERALOGY

COLLEGE OF SCIENCE, LITERATURE, AND THE ARTS

Professor WILLIAM H. EMMONS; Associate Professor FRANK F. GROUT; Assistant Professors A. WALFRED JOHNSTON, CHESSLEY J. POSEY, TERENCE T. QUIRKE; Instructor THOMAS M. BRODERICK.

COURSES

No.	Title	Credits	Offered to	Prereq. courses
	Introductory Courses			
1.	General Geology	3	Soph., jr., sr.	None
3.	Laboratory Work	1	Soph., jr., sr.	Supports 1
4.	Geology of Minnesota	3	Soph., jr., sr.	1
5.	Economic Geology	3	Soph., jr., sr.	1
21.	Elements of Mineralogy	3	Soph., jr., sr.	See statement
29.	General Physiography	3	Soph., jr., sr.	None
34.	Meteorology	3	Soph., jr., sr.	None
35.	Laboratory Work	1	Soph., jr., sr.	Supports 29

For additional courses see the bulletin of the College of Science, Literature, and the Arts.

INTRODUCTORY COURSES

1. GENERAL GEOLOGY. A synoptical treatment of materials of the earth and of geologic processes. Physiographic, dynamic, and structural geology, with a brief introduction to historical geology. Lectures, laboratory work, field excursions, map study, and conferences. EMMONS, JOHNSTON.

3. LABORATORY WORK. Open only to students taking Course 1. Supplements Course 1 with study of rocks and ores, topographic and geologic maps, and reference reading. JOHNSTON.

4. Geology of Minnesota. The physical geography and geologic history of Minnesota. The relations of industrial development to geological features. The principles of pre-Cambrian geology as exemplified in Minnesota. Johnston.

5. Economic Geology. The mineral resources of the United States. The origin, occurrence, distribution, and uses of the more important minerals and mineral fuels of economic value. Lectures, map work, conferences, and field excursions. Quirke.

21. Elements of Mineralogy. Open to students taking Chemistry. The crystal systems; morphological, physical, and chemical character of minerals; occurrence, genesis, and uses of minerals; classification and description of common minerals. Determinative work in laboratory, blowpipe analysis, sight identification. Grout, Broderick.

29. General Physiography. Principles of earth sculpture; physiographic changes in progress, and agencies causing them; hydrography and oceanography; planetary relations; climatology; field excursions. Posey.

35. Laboratory Work. A course in the interpretation of topographic maps. Supplements and should accompany Course 29, tho not required in connection with it. Should be taken by those who expect to teach Physiography. Posey.

GERMAN

COLLEGE OF SCIENCE, LITERATURE, AND THE ARTS

Professor Carl Schlenker; Assistant Professors Oscar C. Burkhard, James Davies, Alfred E. Koenig, Samuel Kroesch, Walter R. Myers; Instructors Elise F. Dexter, Arthur R. Graves, Richard Jente, Edwin H. Zeydel.

COURSES

No.	Title	Credits	Offered to	Prereq. courses
	Introductory Courses			
1a,b.	Beginning	6	All	None
3a,b.	Intermediate	6	All	1
5-6.	Prose and Poetry	*6	All	2 yrs. preparatory
7-8.	Drama	*6	All	5-6 or 4 yrs. preparatory
11-12.	Rapid Reading	*6	All	3
14.	Rapid Reading	6	Soph., jr., sr.	3
16.	Prose and Poetry	6	All	2 yrs. preparatory
21-22.	Scientific Intermediate	*6	All	3
23-24.	Scientific Advanced	*6	All	5-6 or 4 yrs. preparatory

For additional courses see the bulletin of the College of Science, Literature, and the Arts.

* Both semesters must be completed before credit is given for the first semester.

INTRODUCTORY COURSES

1a,b. Beginning. Pronunciation, grammar, conversation, and composition; selected reading in easy prose and verse. Koenig, Dexter, Jente, Kroesch, Myers.

3a,b. Intermediate. Selected texts in modern narrative and descriptive prose; selected lyrics and ballads; a drama of Lessing, Goethe, or Schiller. Assigned readings of texts outside of class. Koenig, Dexter, Jente, Kroesch, Myers.

5-6. Prose and Poetry. Geography, history, and legend. Review of German grammar throughout the year. Burkhard, Davies, Dexter, Graves, Jente, Zeydel.

7-8. Drama. First semester: classic drama; plays of Lessing, Goethe, Schiller. Second semester: modern drama; plays of Hebbel, Sudermann, Hauptmann and others. Assigned readings and reports throughout the year. Schlenker, Burkhard, Davies, Kroesch.

11-12. Rapid Reading. First semester: narrative prose; Hauff, Storm, Sudermann, Goethe's *Hermann und Dorothea.* Second semester: plays of Lessing, Goethe, Schiller, Hebbel. Assigned readings and reports. Davies, Graves.

14. Rapid Reading. Same as Course 11-12. Zeydel.

16. Prose and Poetry. Same as Course 5-6. Dexter.

21-22. Scientific Intermediate. This course aims to give students a reading knowledge of German for use in scientific studies. Not open to those who have obtained credit for either Course 3 or 5-6. Kroesch, Graves.

23-24. Scientific Advanced. Reading of monographs and periodicals. Not open to those who have obtained credit for Course 7-8. Jente.

HOME ECONOMICS

Professor Josephine T. Berry; Assistant Professor Frances V. Ward.

COURSES

No.	Title	Credits	Offered to	Prereq. courses
	Introductory Course			
24.	Camp Cookery	3	Fr.	None

For additional courses see the bulletin of the Courses in Home Economics.

INTRODUCTORY COURSE

24. Camp Cookery. Designed to give prospective foresters, engineers, and others a knowledge of the simpler cookery processes, and of such adaptations as are practicable in the several types of out-of-doors camps. Given in alternate years. Not offered in 1918-19. Ward.

HORTICULTURE

Associate Professors Wilfrid G. Brierley, Le Roy Cady, Maxwell J. Dorsey; Assistant Professor Richard Wellington; Extension Specialist Roger S. Mackintosh.

General statement.—For specialization in this department, see special requirements in Course of Study.

COURSES

No.	Title	Credits	Offered to	Prereq. courses
	Introductory Courses			
6.	Principles of Fruit Growing	3	Soph., jr., sr.	Bot. 1 yr.
13.	Fruit Handling	3	Jr., sr.	See course description
21.	Small Fruit Culture	3	Soph., jr., sr.	Bot. 1 yr.
32.	Market Gardening	3	Soph., jr., sr.	Bot. 1 yr.
33.	Vegetable Forcing	3	Jr., sr.	32
50.	Floriculture	3	Soph., jr., sr.	None
54.	Greenhouse Construction and Management	1½	Jr., sr.	None
56.	Plant Propagation	1	Soph., jr., sr.	None
71.	Landscape Gardening	3	Soph., jr., sr.	None
73.	Nursery Practice	1½	Soph., jr., sr.	None
90a,b.	General Horticulture	3	All	None
94.	Home and School Gardening	3	*Jr., sr.	None
	Advanced Courses			
107.	Orchard Management	3	Jr., sr.	90 or 6
109.	Principles of Genetics	3	Jr., sr.	Bot. 1 yr., An. Biol. 1 yr.
110.	Plant Breeding	3	Jr., sr.	109
111.	Fruit Variety Studies	3	Jr., sr.	90 or 6
131.	Advanced Market Gardening	3	Sr.	32
151-152.	Advanced Floriculture	6	Sr.	50, 54
192.	Special Problems	3	Sr.	107 or 131
193-194.	Hort. Seminar	2	Sr.	9 cred. excl. of 90 and 94

* Open only to those intending to teach.

INTRODUCTORY COURSES

6. Principles of Fruit Growing. The fundamental principles of fruit-growing. Sites, soils, nursery stock, planting and planting plans, tillage, fertilization, cover crops, pollination, frost avoidance, pruning, and thinning. Lectures, recitations, references, and laboratory work. Brierley.

13. Fruit Handling. Lectures on early development, packages, harvesting, packing, by-products, coöperation, marketing, and storage. Laboratory and reference work. Brierley.

21. Small Fruit Culture. Lectures, references, and field trips. Botanical relationship, important species, origin, commercial development, importance, climatic range, sites, soils, propagation, planting plans,

planting, pruning, cultivation, irrigation, cover-crops and mulching, inter-cropping and varieties. BRIERLEY.

32. MARKET GARDENING. The principles of vegetable growing for market, including all important vegetable crops from seed to harvest. Lectures, recitations, references, laboratory work, and excursions. ....

33. VEGETABLE FORCING. The growing and handling of the vegetable forcing crops; types and management of houses. Lectures, reference reading, field trips, and laboratory. ....

50. FLORICULTURE. Designed to give the student a working knowledge of the culture and uses of common house plants, annuals, perennials, and greenhouse plants. Lectures, reference reading, and laboratory. CADY.

54. GREENHOUSE CONSTRUCTION AND MANAGEMENT. The evolution of the greenhouse, types of houses, materials, and methods of construction. Lectures, field trips, and laboratory work. CADY.

56. PLANT PROPAGATION. Methods of propagation of plants by seed, cuttings, layers, grafting, and budding. The principles of greenhouse management, transplanting, watering, and ventilation. Lectures, reference reading, field and laboratory work. CADY.

71. LANDSCAPE GARDENING. The practice and principles of landscape gardening as applied to the home and community. Lectures and field trips to parks and private grounds. CADY.

73. NURSERY PRACTICE. Lectures and practice work in management of nursery stock, seeds, bulbs, and plants, particular attention being given to ornamental stock propagation, planting, and storage. CADY.

*90a,b. GENERAL HORTICULTURE. Lectures and laboratory. A general study of the elementary principles of plant propagation, fruit growing, vegetable gardening, and the planting and care of home grounds. BRIERLEY.

94. HOME AND SCHOOL GARDENING. Same as Agr. Educ. 68. Lectures and laboratory. The elements of horticulture as applied to high-school instruction, plant propagation, fruit growing, home gardening, school gardening, and the planning of home and school grounds. BRIERLEY, CADY, WELLINGTON.

ADVANCED COURSES

107. ORCHARD MANAGEMENT. Lectures, references, laboratory, and special problems. The principal problems connected with the management of orchard and small fruit tracts. BRIERLEY.

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* Students specializing in Horticulture may substitute for Hort. 90 any course in Horticulture for which they are eligible. Students majoring in other divisions who desire to take more specialized work in Horticulture may substitute Hort. 6, 21, 32, 50, or 71, provided that a second course from the same group be elected later. Students majoring in Agricultural Education will take Hort. 94 in the junior year.

109. Principles of Genetics. Given jointly by the Division of Horticulture and the Division of Agronomy and Farm Management. Same as Agron. 103. Lectures and laboratory work designed to familiarize the student with the underlying principles of breeding. Heredity, variation, biometry, and evolution are emphasized. Dorsey, Hayes.

110. Plant Breeding. Given jointly by the Division of Horticulture and the Division of Agronomy and Farm Management. Same as Agron. 106. Applied genetics is emphasized. The method of breeding each of the important agricultural and horticultural crops, with special attention to experiment station investigations and to the methods used by plant breeders. Dorsey, Hayes.

111. Fruit Variety Studies. The classification and distribution of temperate, sub-tropical, and tropical fruits; technical description, identification, and general study of the more important varieties; judging of fruits; fruit literature. Lectures, laboratory work, references. Wellington.

131. Advanced Market Gardening. Lectures, references, and special problems. A study in detail of the various vegetables. Wellington.

151-152. Advanced Floriculture. Lectures, assigned readings, laboratory, and special problems dealing with the culture, botany, and history of florists' plants and methods of greenhouse management. Cady.

192. Special Problems. A study of problems based upon the work given in Courses 107 or 131. Brierley, Wellington.

193-194. Horticultural Seminar. Required of all graduate students and of seniors electing special problem work. Reports and discussion of problems and investigational work. Horticulture Staff.

MILITARY SCIENCE AND TACTICS

Professor Starkey Y. Britt; Instructors Ray Cunningham, Joseph Havlicek; Band Instructor Bert A. Rose.

Required work.—All physically fit male students are required to take military training during their freshman and sophomore years. All students, registered for military drill, freshmen, sophomore, junior, and senior, are members of the Reserve Officers Training Corps.

After the sophomore year students may discontinue military work, if they wish. Freshmen and sophomores receive their uniforms from the United States Government. This course is a prerequisite for graduation from the University.

Elective work.—Juniors who have completed two years of drill, and who are selected for advanced work by the Professor of Military Science and Tactics, and who sign an agreement with the Government, to continue the work for two more years, are eligible for the advanced course in military training, which is prescribed in General Orders 49, and requires five hours work per week—three practical as commissioned officers in the R. O. T. C., and two hours lectures in theoretical subjects. Three credits for each semester are allowed for this work.

All students who complete the advanced course in the Military Department, and who graduate from the University are eligible to be commissioned by the President of the United States, in the Officers Reserve Corps. The men in the advanced course receive their uniforms, and thirty cents per day for rations from the Government.

The old cadet corps has been merged into an Officers Reserve Training Corps, the object being to have 50,000 trained officers as a reserve to be called to active duty when necessary.

MUSIC

COLLEGE OF SCIENCE, LITERATURE, AND THE ARTS

Professor CARLYLE SCOTT; Assistant Professor DONALD N. FERGUSON; Instructors MAXIMILIAN DICK, ABE PEPINSKY, GERTRUDE REEVES.

General statement.—Credit is offered to seniors and juniors in the College of Agriculture, Forestry, and Home Economics, who may wish to elect work in the Department of Music. Six credits may be obtained. The following courses are recommended:

COURSES

No.	Title	Credits	Offered to	Prereq. courses
	Introductory Courses			
9-10.	History of Music	6	Soph., jr., sr.	None
11-12.	Appreciation of Music	2	Jr., sr.	None
*15-16.	Violin	2	Jr., sr.	None
*25-26.	Orchestra	4	Jr., sr.	See statement

For additional courses see the bulletin of the College of Science, Literature, and the Arts.

* Given at the University Farm.

INTRODUCTORY COURSES

9-10. HISTORY OF MUSIC. Some account of primitive systems and of the early Christian modal and harmonic developments, leading to a general survey of musical literature from Bach to the present time. FERGUSON.

11-12. APPRECIATION OF MUSIC. A non-technical course. REEVES.

15-16. VIOLIN. Candidate must be able to play the first ten of Kreutzer's forty etudes, and the easier Handel and Mozart sonatas. DICK, PEPINSKY.

25-26. ORCHESTRA. FERGUSON, PEPINSKY.

PATHOLOGY, BACTERIOLOGY, AND PUBLIC HEALTH

MEDICAL SCHOOL

Professor Harold E. Robertson; Associate Professor Winford P. Larson; Instructors Anne H. Benton, Harold S. Diehl, Siegfried F. Hermann, John C. McKinley.

COURSES

No.	Title	Credits	Offered to	Prereq. courses
	Introductory Course			
6a,b.	Elementary Bacteriology	3	Soph.	None

For additional courses see the bulletin of the Medical School.

INTRODUCTORY COURSE

6a,b. Elementary Bacteriology. Lecture and laboratory course. The principles and technique of general bacteriology. Studies in the morphologic and biologic characters of the common bacteria. Preparation of culture media. Disinfectants and disinfection. Bacteriology of water and food products. Larson, Benton, Diehl, Herrmann, McKinley.

PHYSICAL EDUCATION

FOR MEN

Director Louis J. Cooke; Assistant Director William K. Foster; Instructors D. C. Mitchell, John C. West.

The purpose of the department is to provide all men of the University opportunity for exercise in order to maintain and build up their general health. It also provides special training for the correction of physical defects and functional derangements.

A physical examination is required of all new matriculants, and of all others using the department privileges, at the beginning of the year, and as often during their college course as their physical condition may indicate. Students taking the required work in physical education are examined also at the close of the year. A study of these records shows a marked improvement in the standard of health of the average student during his college course.

The gymnasium, swimming pool, and baths are open to all students of the University, who are free to use the apparatus and to pursue a course in physical training under the supervision of the director and his assistants.

Those students, taking the required course in physical education, who can not swim, must make a reasonable effort, as determined by the department, to pass the swimming and life-saving requirements, and will be assigned special hours for instruction.

COURSES

No.	Title	Credits	Offered to	Prereq. courses
1.	Personal Hygiene	None	Fr.	None
*3a,b.	Gymnasium	None	Fr.	None
5-6.	Intermediate Gymnastics	None	Fr.	None
†7-8.	Advanced Leaders	2	Soph., jr., sr.	1, 3-4, 5-6
9-10.	Corrective Gymnastics	None	All	None
11-12.	Wrestling	None	Soph., jr., sr.	None
13-14.	Advanced Gymnastics	None	Soph., jr., sr.	None
15-16.	Intermediate Swimming	None	All	None
17-18.	Advanced Swimming	None	All	15-16

* Given at the University Farm.

† Both semesters must be completed before credit is given for the first semester.

1. Personal Hygiene. Two hours per week; first six weeks of first semester. Examination at close of course. Cooke.

A special lecture on sex hygiene is given sometime during the first ten days of the autumn semester, with required attendance on the part of all new matriculants.

3a,b. Gymnastics. Two hours a week, last twelve weeks of first semester or first twelve weeks of second semester. Required qualifications in swimming, life-saving, bar-vaulting, jumping, sprinting, running, and on heavy apparatus. Mitchell.

5-6. Intermediate Gymnastics. Elective for freshmen showing exceptional ability in elementary apparatus work. Foster, West.

7-8. Class Leaders (Advanced). Three hours a week. Foster, West.

9-10. Corrective Gymnastics. Three hours a week. Special individual courses for students physically defective. Foster, West.

11-12. Wrestling. Course in competitive wrestling. Most promising candidates chosen to represent Minnesota at the Western Intercollegiate Gymnastic and Wrestling Meet. (Optional.) Foster.

13-14. Advanced Gymnastics. Same as Course 11 and 12 except that it is in gymnastics instead of wrestling. Includes course in ground tumbling, horizontal bar, parallel bars, side horse, and flying rings. Foster, West.

15-16, 17-18. Swimming, Intermediate and Advanced. Life saving, efficiency swimming, and fancy diving. Instruction is given in rescuing and restoring the apparently drowned and other useful swimming accomplishments. Foster.

PHYSICS

COLLEGE OF SCIENCE, LITERATURE, AND THE ARTS

Professors Henry A. Erikson, Anthony Zeleny; Associate Professor Louis W. McKeehan;* Assistant Professor Paul E. Klopsteg;* Instructor Ernest O. Dieterich.

COURSES

No.	Title	Credits	Offered to	Prereq. courses
	Introductory Courses			
1.	General Physics	3	Soph., jr., sr.	Math. 2 or 4 or parallel
2.	General Physics	3	Soph., jr., sr.	1
3.	General Laboratory Practice	1	Soph., jr., sr.	See statement
4.	General Laboratory Practice	1	Soph., jr., sr.	See statement

For additional courses see the bulletin of the College of Science, Literature, and the Arts.

* Both semesters must be completed before credit is given.

INTRODUCTORY COURSES

1. General Physics. Mechanics of solids and fluids, sound, heat. Treatment experimental rather than mathematical; the fundamental principles. First part of a general Course 1-2. Should be taken in conjunction with Course 3. Zeleny, Klopsteg, Dieterich.

2. General Physics. Light, electricity, magnetism. Treatment experimental; fundamental principles, including radioactivity, ionization, X-radiation, and electrical constitution of matter. Second part of general Course 1-2. Should be taken in conjunction with Course 4. Zeleny, Klopsteg, Dieterich.

3. General Laboratory Practice. Physical measurements in the mechanics of solids, fluids, sound, heat, giving students knowledge of experimental methods, and acquaintance with the fundamental facts. Open to all who have completed or are taking Course 1. McKeehan, Dieterich.

4. General Laboratory Practice. Physical measurements in light, electricity, and magnetism. Open to all who have completed or are taking Course 2, and have completed Course 3. McKeehan, Dieterich.

PLANT PATHOLOGY AND BOTANY

Professor Edward M. Freeman; Associate Professor Elvin C. Stakman; Assistant Professor Wieland L. Oswald; Instructors Guy R. Bisby, Robert C. Dahlberg, Godfrey R. Hoerner, F. Jean MacInnes; Assistants Julian G. Leach, Allan G. Newhall; Extension Specialist Arne G. Tolaas.

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* On leave of absence, 1918-19.

General statement.—For specialization in this department, see special requirements in Course of Study.

COURSES

No.	Title	Credits	Offered to	Prereq. courses
	Introductory Courses			
1.	Plant Pathology	3	Jr.	Bot. 1 yr.
6.	Plant Pest Control	3	Jr., sr.	1, Econ. Zool. 3
7.	Weeds and Grasses	3	Soph., jr., sr.	Bot. 1 yr.
9.	Weeds and Seed Testing	3	Soph., jr., sr.	Bot. 1 yr.
10.	Forest Pathology	3	Soph.	Bot. 1 yr.
12.	Seed Problems	3	Jr., sr.	9
14.	Plant Disease Control	3	Jr., sr.	1, Econ. Zool. 3
15.	Diseases of Field Crops	3	Jr., sr.	1
16.	Diseases of Fruit and Vegetable Crops	3	Jr., sr.	1
	Advanced Courses			
104.	Principles of Pathology	3	Jr., sr.	1, Path. 6
105-106.	Mycology	6	Jr., sr.	1, Path. 6
107.	Methods	3	Jr., sr.	1, Path. 6

INTRODUCTORY COURSES

1. Plant Pathology. Elementary study of plant diseases due to fungi, bacteria and slime molds; life histories and preventive methods. Lecture, laboratory, and reference. Not open to those who have completed Course 10. Freeman, MacInnes.

6. Plant Pest Control. Same as Ent. 16. The theory and practice of control of insect and fungous pests of crop plants. Practical applications. Not open to those who have completed Course 14. Stakman, Bisby, Hoerner.

7. Weeds and Grasses. Agricultural and applied botanical study of weeds and grasses with special reference to agricultural importance. Oswald.

9. Weeds and Seed Testing. Detailed study of seed testing methods and seed legislation. Weed and crop seeds and weed plants studied with special reference to identification. Oswald, Dahlberg.

10. Forest Pathology. Elementary study of plant diseases due to fungi, bacteria, and slime molds; life histories and preventive methods. Lectures, laboratory, and reference. Not open to those who have completed Course 1. Offered in alternate years. Given in 1918-19. Freeman, Stakman.

12. Seed Problems. Special seed problems are assigned. Advanced work in seed testing methods. Oswald, Dahlberg.

14. Plant Disease Control. A detailed study of methods of controlling diseases of plants of parasitic origin. Spray materials and spray machinery. Practical applications. Not open to those who have completed Course 6. Given in alternate years; offered in 1918-19. Bisby, Hoerner.

15. DISEASES OF FIELD CROPS. Special detailed study of diseases of cereal and forage crops, including symptomology, etiology, and practical methods of control. Laboratory, lecture, and field work. STAKMAN, LEACH.

16. DISEASES OF FRUIT AND VEGETABLE CROPS. Special study of diseases of fruit and vegetable crops, especially of Minnesota crops including diseases of crops raised under glass. Laboratory, lecture, and greenhouse work. BISBY, NEWHALL.

ADVANCED COURSES

104. PRINCIPLES OF PATHOLOGY. Comparative biology of plant pathogens; pathological plant anatomy, parasitism, biologic specialization, resistance, and immunity. Will be given in close coöperation with Agricultural Biochemistry Division and divisions offering work in Plant Breeding. STAKMAN.

105-106. MYCOLOGY. Study of taxonomy and physiology of fungi with special emphasis on groups of plant pathological interest. STAKMAN, BISBY, MACINNES.

107. METHODS. Plant pathological methods including mycological and bacteriological technique, laboratory, field, and inoculation investigational technique. Laboratory and lecture. Special problems. STAKMAN, BISBY.

POLITICAL SCIENCE

COLLEGE OF SCIENCE, LITERATURE, AND THE ARTS

Professors JEREMIAH S. YOUNG, CEPHAS D. ALLIN; Assistant Professor WILLIAM ANDERSON.

COURSES

No.	Title	Credits	Offered to	Prereq. courses
	Introductory Courses			
1a,b.	American Government	3	Soph., jr., sr.	None
6.	American Municipal Administration	3	Soph., jr., sr.	1
7a,b.	State and Local Government	3	Soph., jr., sr.	1
*28.	Business Law	3	Jr., sr.	1 or Econ. 6 cred.
51.	Business Law, Part I	3	Jr., sr.	1 or Econ. 6 cred.
52.	Business Law, Part II	3	Jr., sr.	51

For additional courses see the bulletin of the College of Science, Literature, and the Arts.

* Given at the University Farm.

INTRODUCTORY COURSES

1a,b. AMERICAN GOVERNMENT. Organization and actual workings of the national government; nature and origin of the American governmental system. YOUNG, ALLIN, ANDERSON.

6. American Municipal Administration. A study of the organization and chief functions of American cities; their growth, relation to the state, forms of charters, inefficiency, and corruption, reform measures; and the administration of finance, police, health, and other activities. Anderson.

7a,b. State and Local Government. Comparison of American state governments, especially Minnesota; relation of states to the United States and to local units of government; recent experiments such as initiative and referendum, the recall and primaries; social and economic legislation. Young, Anderson.

28. Business Law. A course in Business Law (arranged for students in Agriculture) including contracts, agency, mortgages, conveyances, and negotiable instruments. ....

51. Business Law, Part I. The principles of law governing ordinary business transactions, including the general law of contracts, sales, mortgages, bankruptcy, and agency. Young.

52. Business Law, Part II. The law of partnerships, corporations, and negotiable instruments. Young.

POULTRY HUSBANDRY

ANIMAL INDUSTRY GROUP

Professor Arthur C. Smith; Extension Specialist Norton E. Chapman.

COURSES

No.	Title	Credits	Offered to	Prereq. courses
	Introductory Courses			
1.	Poultry	3	All	None
2.	Poultry Judging	3	All	1
4.	Incubating and Brooding	3	All	None

INTRODUCTORY COURSES

1. Poultry. The poultry industry; best methods of care and management of fowls, turkeys, ducks, and geese, and the most important breeds of same. Smith.

2. Poultry Judging. The history, standard-requirements, and common defects of the leading commercial, standard breeds and varieties and determination and standard values by the score card and comparison methods. Smith.

4. Incubating and Brooding. Instruction and practice in incubation and brooding, selection of breeding stock and eggs for hatching, and feeding young chicks. Of practical value to teachers of agriculture and poultry raisers. Smith.

PSYCHOLOGY

COLLEGE OF SCIENCE, LITERATURE, AND THE ARTS

Professor ROBERT M. YERKES;* Associate Professor HERBERT WOODROW; Assistant Professors JOSEPH PETERSON, HENRY T. MOORE; Instructor KARL S. LASHLEY; Teaching Fellow JOHN D. DODSON; Assistant ALICE H. SULLIVAN.

COURSES

No.	Title	Credits	Offered to	Prereq. courses
	Introductory Course			
1a,b.	General Psychology	3	Soph., jr., sr.	None
	Advanced Courses			
101a,b.	Experimental Psychology	3	Jr., sr.	1-2
103-104.	Comparative and Genetic Psychology	6	Jr., sr.	1-2
105.	Mental Retardation	6	Jr., sr.	1-2
107.	Social Psychology	3	Jr., sr.	1-2
110.	Abnormal Psychology	3	Jr., sr.	1-2
115-116.	Psychology Seminar	6	Sr.	12 credits

For additional courses see the bulletin of the College of Science, Literature, and the Arts.

INTRODUCTORY COURSE

1a,b. GENERAL PSYCHOLOGY. The aims and methods of psychology; the facts, laws, and functions of mental life; development and learning in relation to training and instinct. Required for teacher's certificate. DODSON, LASHLEY, MOORE, PETERSON, WOODROW.

ADVANCED COURSES

101a,b. EXPERIMENTAL PSYCHOLOGY. Training course in mental measurements. WOODROW.

103-104. COMPARATIVE AND GENETIC PSYCHOLOGY. Mental evolution and development. The application of the comparative method to conscious behavior. LASHLEY.

105. MENTAL RETARDATION. A study of retarded mental development, its causes and treatment. WOODROW.

107. SOCIAL PSYCHOLOGY. A study of the mental interactions of individuals in society with especial reference to the instinctive emotional basis of human association. MOORE.

110. ABNORMAL PSYCHOLOGY. Unusual and pathological phenomena; the subconscious, dreams, suggestibility, mental disorders, secondary personalities. PETERSON.

115-116. SEMINAR IN PSYCHOLOGY. WOODROW.

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* On leave of absence, 1918-19.

RHETORIC

Assistant Professor ROBERT C. LANSING; Instructors ESTELLE COOK, GEORGE G. GLICK, RUTH MOHL.

General statement.—Rhetoric credits will not be granted officially until the close of the first semester of the senior year.

At least one quiz paper will be selected at random each semester from other than rhetoric classes and read by the Rhetoric section. In addition any instructor may nominate and submit papers for any junior or senior who in his opinion requires special consideration.

The Rhetoric section may require upper-class students to take, without credit, additional courses in rhetoric in order to validate their freshman and sophomore rhetoric credits.

Students whose work in Rhetoric 1 shows at any time an inadequate knowledge of the conventions of English will be required to drop the course and enter Rhet. 3. These students will be required to complete fifteen credit hours of work in rhetoric.

COURSES

No.	Title	Credits	Offered to	Prereq. courses
	Introductory Courses			
1a,b.	Rhetoric	3	Fr.	None
2a,b.	Rhetoric	3	Fr.	1
3.	Elementary Rhetoric	3	Fr.	None
11a,b.	Argumentation	3	Soph., jr.	2
22a,b.	Public Speaking	3	Soph., jr.	11
24a,b.	Adv. Public Speaking	3	Soph., jr., sr.	22 or 25
*25a,b.	Fundamentals of Effective Speaking	2	Soph., jr., sr.	2

* Not offered second semester, 1918-19.

INTRODUCTORY COURSES

1a,b. RHETORIC. Note taking, thesis writing, oral and written exposition, sentence and paragraph structure, analysis of prose models, book reviews. LANSING, GLICK, MOHL.

2a,b. RHETORIC. Description, narration, diction, argumentation, oral composition, book reviews. LANSING, GLICK, MOHL.

3. ELEMENTARY RHETORIC. Elementary grammatical and rhetorical principles. MOHL.

11a,b. ARGUMENTATION. Evidence, reasoning, briefing, debating. LANSING, GLICK, MOHL.

22a,b. ELEMENTARY PUBLIC SPEAKING. The fundamentals of effective speaking; organization and delivery of occasional addresses, and practice in parliamentary drill. GLICK.

24a,b. ADVANCED PUBLIC SPEAKING. A practical course in the preparation and delivery of the informal lecture, including a study of modern eloquence. Practice in conducting assemblies. GLICK.

25a,b.* FUNDAMENTALS OF EFFECTIVE SPEAKING. The fundamental principles of voice production, articulation, gesture, platform deportment and expression. COOK.

ROMANCE LANGUAGES

COLLEGE OF SCIENCE, LITERATURE, AND THE ARTS

Professors EVERETT W. OLMSTED, IRVILLE C. LE COMPTE, COLBERT SEARLES; Assistant Professors FRANCIS B. BARTON, JULES T. FRELIN, RUTH S. PHELPS; Professorial Lecturer BALBINO DÁVALOS; Instructors PEDRO HENRÍQUEZ UREÑA, ENRIQUE JIMÉNEZ, GUSTAAF VAN ROOSBROECK, SOLOMON M. DELSON; Assistants CLEMENT J. DEBÈRE, JOSEPHINE M. DEBOER; Teaching Fellows HERBERT E. CLEFTON, AMELIA M. DOYLE, ANTONIO GERVASI.

COURSES

No.	Title	Credits	Offered to	Prereq. courses
	Introductory Courses			
1a,b.	Beginning French	6	All	None
3a,b.	Intermediate French	6	All	1 or equiv.
4.	Survey of French Literature	6	All	1 or equiv.
5-6.	Survey of French Literature	6	All	3 or equiv.
7-8.	Elemen. French Conversation	2	All	3 or equiv.
9-10.	Elemen. French Composition	1	All	3 or equiv.
31a,b.	Beginning Spanish	6	All	None
33-34.	Beginning Spanish	6	All	None
35b.	Intermediate Spanish	6	All	31 or equiv.
37-38.	Intermediate Spanish	6	All	31 or equiv.
39-40.	Survey of Spanish Literature	6	All	35 or equiv.
41-42.	Elementary Spanish Conversation	2	All	35 or equiv.
43-44.	Elementary Spanish Composition	2	All	35 or equiv.

For additional courses see the bulletin of the College of Science, Literature, and the Arts.

INTRODUCTORY COURSES

1a,b. BEGINNING FRENCH. Pronunciation, grammar, drill, oral exercises and translation. SEARLES, BARTON, CLEFTON, DEBÈRE, DEBOER, DELSON, DOYLE, FRELIN, GERVASI, VAN ROOSBROECK.

3a,b. INTERMEDIATE FRENCH. Review of grammar, composition, conversation, and reading, representative authors of the Nineteenth Century. LECOMPTE, VAN ROOSBROECK.

4. SURVEY OF FRENCH LITERATURE. Double course. Same as 5-6. SEARLES.

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* Not offered second semester, 1918-19.

5-6. General Survey of French Literature. Lectures, recitations, and assigned readings. Designed to cover the whole period in historical outline, and to prepare for a more minute study of special periods. Selections from representative authors. LeCompte, Barton, Phelps, van Roosbroeck.

7-8. Elementary French Conversation. Small amount of outside preparation will be required. The section meeting at nine o'clock on Monday, Wednesday, and Friday is limited to students taking Course 5-6 and is based on the work of that course. Frelin, Barton, deBère.

9-10. Elementary French Composition. Frelin, Barton, deBère.

31a,b. Beginning Spanish. Pronunciation, grammar drill, oral exercises, and translation. Dávalos, Delson, Henríquez, Jiménez.

33-34. Beginning Spanish. This course is the same as Course 31 except that it is a year course. Olmsted, Dávalos, Henríquez, Jiménez, Phelps.

35b. Intermediate Spanish. Review of grammar, composition, conversation, and readings. Henríquez, Jiménez.

37-38. Intermediate Spanish. This course is the same as Course 35a,b, except that it is a year course. Dávalos, Jiménez.

39-40. Survey of Spanish Literature. Lectures, recitations, and assigned readings. Henríquez.

41-42. Elementary Spanish Conversation. A small amount of outside preparation required. The life and customs of modern Spain; accompanied by illustrative material. Jiménez.

43-44. Elementary Spanish Composition. Special attention given to social and commercial correspondence. Jiménez.

RURAL AND AGRICULTURAL JOURNALISM

Associate Professor William P. Kirkwood; Assistant Professor Phil C. Bing.

General statement.—The aim of this Division is to give practical training in rural and in agricultural journalism. The work in rural journalism includes the editing and managing of the country newspaper. The work in agricultural journalism covers writing for the rural press, for the agricultural press, bulletin writing, and agricultural publicity.

COURSES

No.	Title	Credits	Offered to	Prereq. courses
	Introductory Courses			
1.	Rural Press and Rural Life	1	Soph., jr., sr.	None
6.	Business Administration	3	Sr.	16

No.	Title	Credits	Offered to	Prereq. courses
7.	Editorial Administration..........	3	Sr.	16
11-12.	Agricultural Journalism..........	6	Jr., sr.	†Rhet. 2 yrs. or Rhet. 1 yr., Eng. 1 yr.
*13-14.	Reporting	6	Soph., jr., sr.	Rhet. 1 yr.
*16.	Copy Reading....................	3	Jr., sr.	13-14
*17.	News Editing....................	3	Jr., sr.	16
18.	Bulletin Writing and Agricultural Publicity	3	Sr.	11-12

* Courses 13-14, 16, and 17 will be given by this Division in case they are not offered in the College of Science, Literature, and the Arts.

† Rur. and Agr. Jour. 13 also advised.

INTRODUCTORY COURSES

1. Rural Press and Rural Life. The relations of the rural press to rural and community life; rural problems and how the rural press may assist in their solution. Kirkwood.

*6. Business Administration. The business problems of the rural weekly including general accounting, job cost finding, circulation building, and advertising problems. ....

7. Editorial Administration. The editor in his capacity as editor; formulation of policy; organization of news-gathering staff; presentation of the news to the public. Kirkwood.

11-12. Agricultural Journalism. Gathering and writing agricultural news and the writing of articles for the agricultural press and other class papers. Lectures and practical work on Agricultural College publications. Kirkwood.

13-14. Reporting. Organization, methods, and material in newspaper production; forms of newspaper stories; methods of gathering and writing news; laboratory practice by assignments on University publications. Bing.

16. Copy Reading. Study and practice in editing copy for the newspaper and in writing headlines. Laboratory practice. Bing.

17. News Editing. Continuation of Course 16 with special attention to type, make up, and printing. Laboratory practice on University publications. Bing.

18. Bulletin Writing and Agricultural Publicity. The application of the rules of writing for the press to preparation of popular and technical bulletins. Mediums and methods through which information may be brought to attention of communities and people of the open country. Kirkwood.

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* Special courses in advertising will be provided as soon as demanded.

SOCIOLOGY AND ANTHROPOLOGY

COLLEGE OF SCIENCE, LITERATURE, AND THE ARTS

Professors Albert Ernest Jenks, Arthur J. Todd; Associate Professor Luther L. Bernard.

General statement.—Modern university education is not complete unless the graduate has obtained the social point of view. To this end the department offers elementary courses dealing with peoples, with social forces, institutions, and movements. Its more advanced courses are designed especially for students majoring in the social sciences, namely: sociology and anthropology, economics, history, and political science.

COURSES

No.	Title	Credits	Offered to	Prereq. courses
	Introductory Courses			
1a,b.	General Introduction	3	Soph., jr., sr.	None
6.	Social Reform Movements	3	Soph., jr., sr.	1
14.	Rural Sociology	3	Jr., sr.	None
	Advanced Courses			
113.	The American People	3	Jr., sr.	3 courses, incl. 1
114.	The American People (continued)	3	Jr., sr.	113
119.	The Family	3	Jr., sr.	9 cred.

For additional courses see the bulletin of the College of Science, Literature, and the Arts.

INTRODUCTORY COURSES

1a,b. General Introduction. Elemental activities, institutions, laws, and theories. Especial emphasis is placed on descriptive data. Textbook and lectures. Jenks,* Bernard, Todd.*

6. Modern Social Reform Movements. A survey of the attempts to overcome certain social maladjustments: child labor, the city, the tenement, poverty, degeneracy; movements for public health, old age pensions, social insurance, protection of infancy and youth, public recreation, etc. Todd.

14. Rural Sociology. A survey of the field of Rural Sociology; description of rural social interests; analysis of fundamental problems of rural life; nature and influence of rural environment; characteristics of rural mind. Bernard.

ADVANCED COURSES

113. The American People. Dominant characteristics of the diverse foreign peoples now in the United States; their modification in America; the importance of these peoples to the American nation. Lectures, readings, and essay. Jenks.

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* First semester only.

114. The American People (continued). A continuation of Course 113. Essential and unique historical Americanisms, and their value and virility for the future; facts and forces of amalgamation and assimilation in America; America's ethnic problems. Lectures, readings, and essay. Jenks.

119. The Family. A study of the historical development of forms of the family, and their relation to other social institutions. The modern family, its functions, and its problems. Todd.

SOILS

Professor Frederick J. Alway; Instructors Paul R. McMiller, Clayton O. Rost; Extension Specialist George H. Nesom.

General statement.—For specialization in this department see special requirements in Course of Study.

COURSES

No.	Title	Credits	Offered to	Prereq. courses
	Introductory Course			
2.	Soils	4	Jr., sr.	Chem. 1 yr.
	Advanced Courses			
104a.	Chemical Analysis of Soils	5	Sr.	2, Quant. Anal.
105-106.	Special Problems in Soils	†	Sr.	104, 107
107.	Mechanical Analysis of Soils	2	Jr., sr.	2
110.	Minnesota Soils	2	Sr.	2

† Credit according to the amount of work.

INTRODUCTORY COURSE

2. Soils. Formation, physical properties, and chemical composition of soils; micro-organisms of the soil; farm manures, green manures, commercial fertilizers, and soil amendments; causes of unproductivity. Lectures, recitations, and laboratory work. McMiller.

ADVANCED COURSES

104. Chemical Analysis of Soils. A laboratory course on the chemical examination of soils, fertilizers, and soil amendments. Rost.

105-106. Special Problems in Soils. Individual laboratory or field work upon some special soil problem in soil physics, soil chemistry, or soil management. Arrangement must be made in advance. Alway.

107. Mechanical Analysis of Soils. A laboratory course on the beaker, and centrifuge methods of mechanical analysis. McMiller.

110. Minnesota Soils. Detailed study of the soils of Minnesota. Origin, formation, and classification; physical and chemical characteristics; moisture relations; response to manures, fertilizers, and soil amendments; naturally unproductive types and their reclamation. Lectures, laboratory, and field work. Alway.

VETERINARY MEDICINE

ANIMAL INDUSTRY GROUP

Professors Clifford P. Fitch, Myron H. Reynolds; Assistant Professors Willard L. Boyd, Howard C. H. Kernkamp; Instructor William A. Billings; Assistant Clarence B. Lord.

COURSES

No.	Title	Credits	Offered to	Prereq. courses
	Introductory Courses			
2.	Anatomy of Domestic Animals	3	Soph., jr., sr.	None
3-4.	Comparative Physiology	6	Jr., sr.	2
5.	Veterinary Bacteriology	1	Soph., jr., sr.	Path. 6
6.	Physiology and Hygiene of Breeding	2	Jr., sr.	2
8.	Veterinary Studies	3	Jr., sr.	None
12.	Common Diseases of Domestic Animals	3	Sr.	3-4

INTRODUCTORY COURSES

2. Anatomy of Domestic Animals. Anatomy of the common farm animals with special reference to bones, muscles, and viscera. Lectures and demonstrations. Kernkamp.

3-4. Comparative Physiology. A recitation and lecture course in physiology with special reference to the physiology of domesticated animals. Special emphasis is given to digestion and metabolism. Fitch.

5. Veterinary Bacteriology. Lecture and demonstration course in Veterinary Bacteriology. Special emphasis being given to causes of infectious diseases of animals, also instruction in disease control measures and in preparation and use of vaccines, bacterins, serums, antitoxins. Fitch.

6. Physiology and Hygiene of Breeding. Anatomy and physiology of reproduction. Embryology, obstetrics, sterility, hygiene, and common diseases of breeding animals. Boyd.

8. Veterinary Studies. Preparatory work for study of diseases; causes, prevention, etc., of common diseases including lameness and unsoundness; common medicines. For students taking only one semester of veterinary work. Not open to those who have completed Course 12. Reynolds.

12. Common Diseases of Domestic Animals. General principles of diagnosis, causes, morbid anatomy, symptomatology, prevention, and the basis of treatment of the ordinary diseases of the domestic animals. Those who have completed Course 8 can obtain only half credit for this course. Boyd.

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